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MODEL Airplane NEWS

NOVEMBER 2000 • VOLUME 128, NUMBER 11

ON THE COVER: the Global Hobby Distributors Blue Max ARF delivers fun at the flying field; see Chris Chianelli's review on page 32. Insets: build Jerry Small's profile Gee Bee racer and pylon race indoors (see page 64); Nick Ziroli Jr.'s Grumman Avenger placed second at this year's Top Gun Invitational and won the Critics' Choice award. For an up-close look at this masterpiece, see page 28.

Features

Construction

Reviews

Columns

Departments

EDITORIAL

BY DEBRA SHARP

Indoor Thompson Trophy racing

If you're looking for something a little different to do, why not get a few modeling friends together and go pylon racing—indoors? One of our construction articles this month describes a simple, 3-channel profile Gee Bee that features sheeted-foam-and-balsa construction and is powered by a geared 1524 motor. Author Jerry Small and his fellow Dallas/Ft. Worth fliers have come up with some basic rules and specifications for racing these miniature Thompson Trophy models indoors. As Jerry writes, "It's too much fun to see three or more of these micro models dogging it out!"

Modelers in Dallas/Ft. Worth have been racing these profile Thompson Trophy models indoors for more than a year; see page 64 for construction plans for a profile Gee Bee and join the fun!

Also in this issue, longtime scale designer Nick Ziroli Sr. treats us to his Aeronca Champ, an electric-powered backyard flyer. Known for his giant-scale airplanes, Nick says that he hadn't built a "stick-and-tissue" model in a long time, and he thoroughly enjoyed the experience. This classic design uses the latest in off-the-shelf, lightweight RC gear and has excellent flight performance with a geared Speed 280 motor.

It's no wonder that small electrics are attracting even dyed-in-the-wool giant-scalers; the available equipment is very reliable and becoming less expensive all the time. Check out Bob Aberle's review of a narrowband, highly selective micro receiver that's about the size of a standard postage stamp and costs less than $30!

How often have you had to pack up at the field because it became too windy to fly? The flight techniques in Roger Post's article, "How to Fly on a Windy Day," will help you to develop your piloting skills and allow you to fly more confidently—and more often! From taxiing upwind and downwind to landing in crosswind, Roger's well-illustrated article provides a solid foundation on which to build your piloting skills. See page 58.

In his "Thinking Big" column, senior technical editor Gerry Yarrish describes how to install a basic smoke system in a giant-scale model. A white smoke trail is a great way to add excitement to your flying routine, and it's easy to do if you know the best equipment to use for your application. The information in Gerry's column isn't limited to giant-scalers; if you fly smaller 4-strokes, you can also use these tips and techniques to wow the crowd.

Smoke adds visual impact and fluid movement to your flight routine. See Gerry Yarrish's article on how to install smoke systems on page 94.

International correspondent Guy Revel and contributor Rich Uravitch both attended the first-ever Combined Asian-Oceanic Continental Championships for F3A aerobatic flying. This debut event in Singapore allowed top pilots from Japan, Australia, New Zealand, Korea, China, Thailand and Singapore to meet and compete. See page 70 for a peek at the action on the Pacific Rim.

MODEL Airplane NEWS

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AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," MODEL AIRPLANE NEWS, 100 East Ridge, Ridgefield, CT 06877-4606 USA; man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.

PULL/PULL PUZZLE

I love your "Thinking Big" column; I always find something I can use in the topics you cover. I have a specific question, though: I am building a Uravitch SE5a biplane and would like to use pull/pull cables to work the rudder. What do you use for pull/pull cables? I have talked to other modelers who claim that metal pull/pull cables running in the same direction as my antenna can cause problems with interference and shortened radio range. What do you suggest?

RANDY WATKINS
Brookfield, VT

Randy, if your antenna is close to—and parallel with—steel pull/pull cables, it can sometimes cause a problem. If you run the antenna wire externally to the fin top or the stab tip, it should not be a problem, as there will be plenty of separation.

I use plastic-coated, steel U-control cable that's 0.007 inch thick. I loop and crimp the ends with short lengths of brass tube and use Du-Bro threaded clevis ends. I have also used Sullivan orange Kevlar thread with excellent results. Be sure to use sections of plastic tubing as fairleads inside the fuselage to guide them because, when they vibrate, pull/pull cables can easily "saw" through inner structures. To relieve stress at the servo-output arm, I make a tiller arm from aluminum or plywood with a music-wire and brass-tube pivot and mount the assembly close to the servo. Then I install a short metal pushrod from the tiller to the servo. This works very nicely, and you can adjust the geometry to get the proper throw. Hope this helps. GY

SONIC JOKE

I'm a longtime subscriber to *Model Airplane News*. I try to keep abreast of any new technological feats, but while reading the August issue, I came across something that blew my mind. The Top Gun 2000 article's sidebar, "Halftime high jinks," mentions a "mini-turbine-powered sonic boom." I was blown away by this. Is it a supersonic RC plane, or am I reading the article a little too literally? Thanks; keep up the great work! [email]

JOSEPH O'LOUGHLIN

Joseph, yes; you are taking that bit of "disinformation" just a bit too seriously. The "sonic boom" we referred to was a special effect put on by Terry Nitsch. It was actually a firecracker placed on the runway and ignited as Terry flew the model past it at very high speed. The effect was as if the sound barrier had been broken. Sorry for blurring reality with pyrotechnics! GY

TAMING TAIL-DRAGGERS

Gerry Yarrish's "Thinking Big" column that dealt with flying tail-dragger airplanes was good, but it omitted one important thing about setting up a tail-dragger model: the main gear must have equal toe-in on each main wheel. Most wire gears will have the opposite after a few landings, and that makes ground-handling a bear.

M. O'NEILL
Placentia, CA

It is true that for tail-draggers, a degree or two of toe-in helps the model keep its tail behind it when landing or taking off. I was speaking more generally about the flying aspects of tail-draggers and appreciate your comment on the physical setup of the model's landing gear; maybe I'll write about the geometry issues of landing gear in a future column. Thanks for your comments. GY

DE HAVILLAND BEAVER

In the September 2000 issue's article on float flying, you have a large photo of what looks like a de Havilland Beaver on the story page and an inset on the cover. I'd like to get that model and am having trouble finding one.

AL ROUSSEAU
Riverview, FL

Al, Jerry Nelson took that photo at a float fly a few years ago. Richard Cook of Duvall, WA, built that model from an Ikon N'west kit; you can reach them at (800) 327-7198, or (208) 773-9001. DS

New products or people behind the scenes: my sources have been put on alert to get the scoop! In this column, you'll find new things that will at times cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

AIR SCOOP

BY CHRIS CHIANELLI

GERMAN INVASION

Bahüer Modelsport's new-for-2000 models include the 64-inch-span "Drack" (a WW I-era bipe) and the 87-inch-span Junkers Ju-52. Bahuer touts its unique "paper-like" construction material as an interesting alternative to the more conventional balsa, Styrofoam and fiberglass. According to the press release, the material

is oil-, gas- and water-resistant, easily repairable and environmentally friendly. Sounds good to me! The Drack requires a 4-channel radio and a .75- to .90-size engine, and the Ju-52 needs a 5-channel radio and can be powered by either three .25- to .32-size 2-cycle engines or one .75- to 1.08-size 2-cycle engine. Or, go electric and power the Ju-52 with three Speed 600-size motors. Whew!

Bahüer Modelsport is imported by Hi Country Hobbies, (800) 862-7196, email: flyrc@rcmodelairplanes.com, website: www.rcmodelairplanes.com.

Saito 72

If you're looking for some potent 4-stroke horsepower for your .60-size model that will also drop into a space that once held a .56, you'll want to check out Saito's latest release: the new .72. At 16.6 ounces, it's the lightest engine in this 4-cycle displacement category. The .72 has the same mounting-bolt pattern as the .Saito .56, but it is not simply a bored-out .56, and it features an all-new crankcase and crank-web counterbalance. This is achieved by narrowing the case just below the mounting flanges. Those of you who like to turn your models into over-powered "hot-rods" with a minimum of weight gain—and I know you're out there—should check out Saito's new .72. It's available in standard or Golden Knight versions that feature a glossy black powder-coated finish with gold rocker covers. Specs: bore—27mm; stroke—20.6mm; displacement—11.8cc; compression ratio—7:1; horsepower—1.2; operating range—2,000 to 11,000rpm; weight—16.6 ounces.

Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.

FLY-AT-HOME FOKKER

Hangar 9 joins the micro-electrics mania with its new Fokker Eindecker park flyer, available as a 90-percent built ARF kit. With a preinstalled, 4:1 geared 280 motor, the little Fokker consistently provides 10-minutes-plus flight times if you use a 7-cell, 600mAh pack. Excellent parts quality and fit and ample power make this park flyer a cinch to build and a blast to fly.

Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.

A NEW B-2 FOR YOU

Trick R/C's new foam B-2E comes with just about everything you need to fly except radio gear. An 8-cell, 1700 pack, an ESC, a charger and a Speed 400 motor are all included in the kit, as are Deans Ultra plugs all around! Full hardware, a prop, fiber tape and black covering tape round out this super-complete package. Trick R/C claims flight times of 10 minutes at full power—ample time for your "bombing runs." Order online, or go to your local hobby shop.

Trick R/C, 938 Victoria Ave., Venice, CA 90291; phone/fax (310) 301-1614; www.Zagi.com.

DGS 2

Onboard solid-state ignition

The JHM Aero DGS 2 not only improves idle and lets you start your engine without an external battery, but—because of MOSFET technology—it also plugs directly into your receiver via a Y harness, thereby eliminating the need for clumsy switches or relays. The unit can be adjusted to turn on the glow plug(s) at any throttle setting, and the LED indicates when the glow plug(s) is on. Other features include throttle direction reverse; AM, FM and PCM compatibility; receiver-off shutdown safety and onboard, 1.2V "C"- or "D"-cell included. It's available in two models: DGS 2 for one or two glow plugs, and DGS 5 for up to five glow plugs.

JHM Aero Engineering, 123 Radford Cir., Marietta, GA 30060; (770) 438-7146.

SUPER KRAFT **F3D**

How fast do you want to fly? Super Kraft's new F3D/30 ARF Pylon Racer is ready to put your skills to the test. This .30-size fiberglass is unique; it comes painted in red and white or blue and white with most of the work already done for you. Simple to build, it features a one-piece wing and stab with many parts installed at the factory. Specs: wingspan—55 inches; length—36.6 inches; wing area—473.8 square inches; weight—3 to 4 pounds; engine size—.32 to .40 2-cycle; radio required—4-channel with 5 servos.

Kankge Industrial USA Inc., 65 E. Jefryn Blvd., Deer Park, NY 11729; (877) 203-2377.

KYOSHO
Electric Cessna

Learning made easy

Some trainer models come with a price and a level of complexity that can make even the bravest beginner think twice about getting into RC flying. But Kyosho's EP Cessna 180 arrives approximately 80-percent assembled, so there's little finishing to do to get it flight-ready, and Kyosho has taken the extra step of installing the 550 motor, direct-drive system and all linkages for you. Foam construction means it's extremely light and durable, and its compact size and quiet electric power allow you to fly it in small areas. The required Ni-Cd battery can be installed quickly and easily in the bottom of the plane's fuselage. And even though it's a trainer, you'll be impressed by the model's stylish Cessna profile, right down to the scale-looking cowl. For more info on Kyosho's planes, go to www.kyosho.com. Specs: wingspan—51.2 inches; wing area—408 square inches; weight—3.1 pounds; length—36.2 inches; radio required—2- to 3-channel; 7.2V, 1400mAh Ni-Cd battery and charger.

Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.

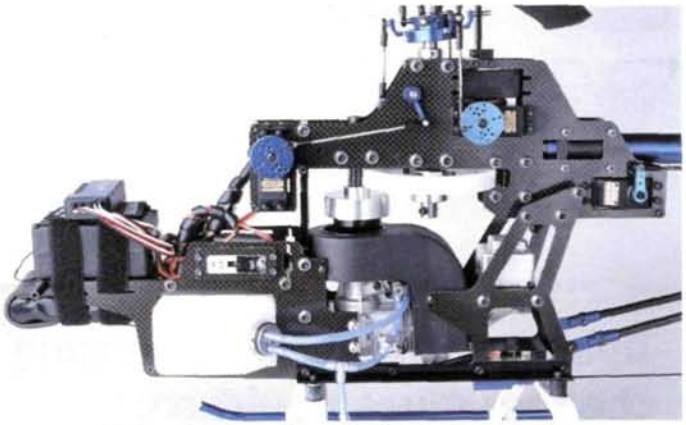
BENCH DRILL AND MINI BENCH SAW FROM MINICRAFT

New from Minicraft is this complete kit featuring the MB410 super-precise miniature table saw. It's ideal for cutting and stripping wood to very narrow widths and various angles using the included miter guide and rip fence. The MB410 will also cut plastic and thin metals. Don't let the size of this little monster fool you; at 18,000rpm, it packs a lot of power, according to Minicraft! Kit includes: MB410 bench saw; MB730 variable speed transformer; three assorted saw blades for various cutting tasks (wood, plastic and metal); miter guide and rip fence and handy carrying and storage case.

Also new from Minicraft is the precision MB680 bench drill. Made from cast alloy, this is one solid drill press! It features a calibrated lever for full drill depth control: 0 to 20mm (.78 inch) mounting holes for the MB715 machine vice and mounting holes to attach the MB680 to your workbench. A clear safety guard and five high-speed drill bits with collets are also included. The lever can be moved left or right to suit individual preferences, and the Minicraft MB1932 keyless chuck can be added to make drill-bit changes easier. The entire head can be moved up and down to suit your drilling needs. An MB730 or MB750 power supply is required; a combo kit will be available by press time.

Minicraft also carries many other high-quality precision tools, all made in England. These tools come with a 2-year warranty and total product support out of its Flemington, NJ, location, which stocks a huge supply of accessories, many of which are compatible with other brands of rotary tools. Call or write to them for a free catalog.

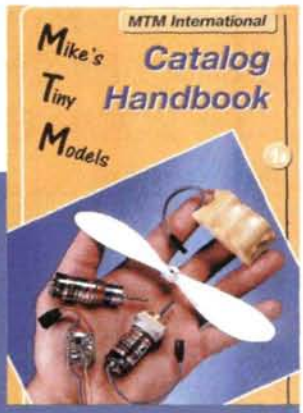
Minicraft, 15 Minneakoning Rd., Ste. 107, Flemington, NJ 08822; (908) 806-4090; fax (908) 806-4061.



PROPER CHOPPER

The Quick 30 Pro is the first heli from Hobbies & Helis Intl., featuring CCPM/EMS mixing along with a 120-degree swashplate. Included carbon-boom supports, dual bearings in the tail, a pressurized fuel tank and a machined, assembled head ensure that you will not have to spend your hard-earned bucks on upgrading this heli. With its many prebuilt subassemblies, the Quick 30 Pro can be built quickly.

Hobbies & Helis Intl., 201 S. 3rd St., Coopersburg, PA 18036; (610) 282-4811; fax (610) 282-4816; HHl@Fast.net.



IT'S SO LITTLE!

Of course it's little; it's the new 34-page catalog from Mike's Tiny Models. All the micro-RC parts and electronics you'll ever need for your slow or park flyer, including some motors and gearboxes that you just can't find elsewhere, are in here.

MTM Intl., Walkemuhlenweg 29, 37083 Gottingen, Germany; phone: +49-551-770 77 36; fax 49-551-770-7736; mike@mtm-int.com.

BACKYARD AEROBAT

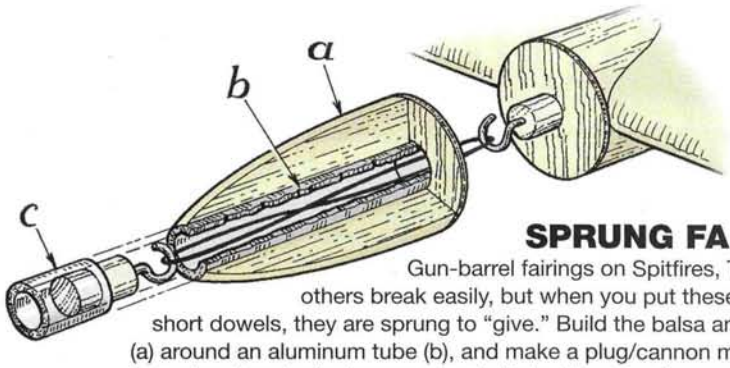
Herr Engineering has a well-earned reputation for ultra-precise engineering in its models. Herr's latest model is this ½A sport-scale Pitts Special. With computer-designed and laser-cut parts, you know it will go together smoothly and handle well. Looks sharp, too. Wingspan—30 inches; wing area—300 square inches; weight—27 ounces; wing loading—12.98 ounces per square foot; engine—.061 to .074; list price—$79.95.

Herr Engineering Corp., 1431 Chaffee Dr., Ste. 3, Titusville, FL 32780; (407) 264-2488; fax (407) 264-4230; www.iflyherr.com.

HINTS & KINKS

BY JIM NEWMAN

SEND IN YOUR IDEAS. *Model Airplane News* will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



SPRUNG FAIRINGS

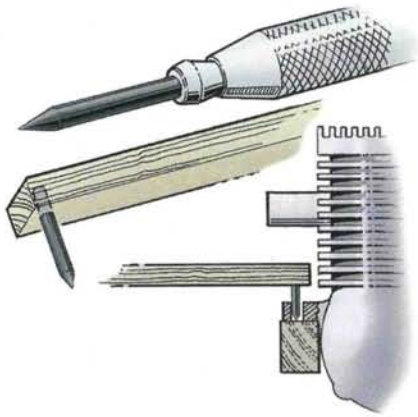
Gun-barrel fairings on Spitfires, Tempests and others break easily, but when you put these fairings on short dowels, they are sprung to "give." Build the balsa and ply fairing (a) around an aluminum tube (b), and make a plug/cannon muzzle (c) from dowel and rolled paper or metal tube. Use a spring or rubber band between the hooks to retain the fairing. Mount antenna masts in the same manner.

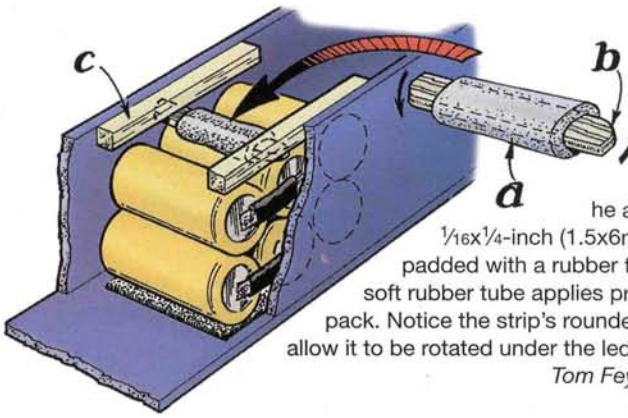
Dennis Bryant, Burgess Hill, Sussex, England

90-DEGREE PENCIL

Drill a small hole in a wood strip and glue a short piece of mechanical-pencil lead in it. This is a great tool for marking engine mounting holes when you can't see around the engine's exhaust.

Melvin Pamment, Paw Paw, MI





NI-CD SECURITY

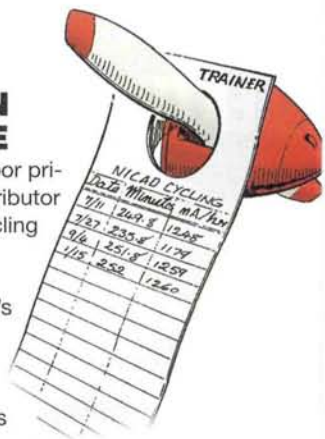
Tom mounts his Ni-Cds on Velcro®-brand fasteners, and he also uses this twist-in 1/16x1/4-inch (1.5x6mm) plywood keeper padded with a rubber tube (a) on top. The soft rubber tube applies pressure on the battery pack. Notice the strip's rounded ends (b), which allow it to be rotated under the ledges (c).

Tom Fey, Arlington Heights, IL

HANG IT ON YOUR NOSE

Inspired by hotel-door privacy tags, this contributor hangs his Ni-Cd cycling record on the prop blade for a handy record of the model's Ni-Cd state. A similar card hangs on the transmitter antenna to record its Ni-Cd capacity.

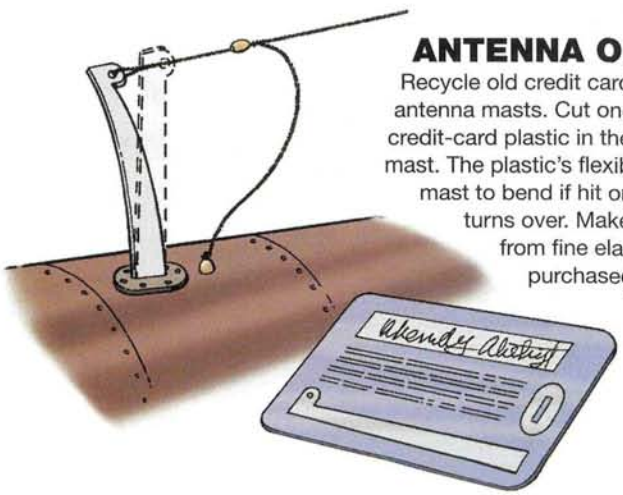
Bill Braatz, Merrillville, IN



ANTENNA ON CREDIT

Recycle old credit cards into dummy antenna masts. Cut one or more layers of credit-card plastic in the shape of the mast. The plastic's flexibility allows the mast to bend if hit or if the model turns over. Make the antenna wire from fine elastic shirring thread purchased at a fabric shop.

Thomas Coleman, Bloomfield, CT



GET A HOLD ON IT

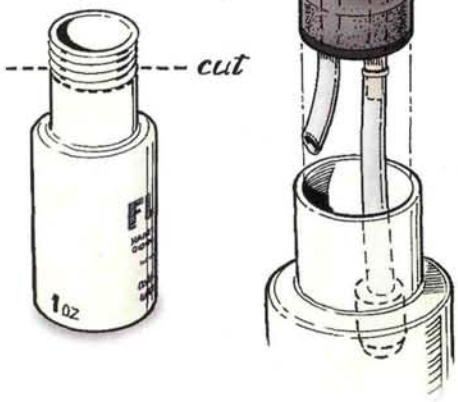
To insert an Allen-head screw into a deep recess, use an Allen wrench to force a small disk of paper towel into the screw head. The Allen wrench will fit tightly and prevent the screw from falling off the end.

Ashley Wilson, Virginia Beach, VA

SQUEAKY CLEAN TANK

A Sullivan no. 482 stopper kit fits perfectly into the top of a cut-down, 1-ounce travel shampoo-bottle. This combo makes a great clunk tank that gives a 4-minute run on a .10 engine.

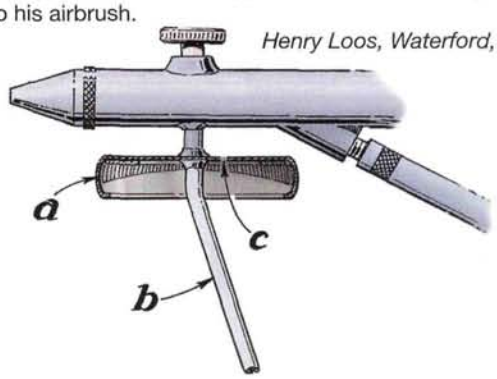
Ron McCue, Ballston Lake, NY



MORE PAINT

Frustrated with the small paint reservoir on his airbrush, this reader soldered a baby food jar lid (a) to the airbrush dip tube (b), then drilled a 1/16-inch (1.5mm) vent hole (c). Now he can screw a jar full of paint to his airbrush.

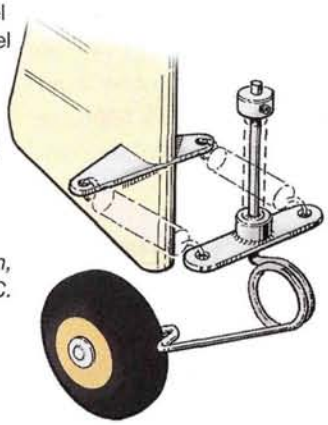
Henry Loos, Waterford, NY

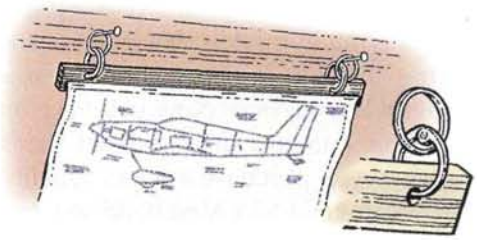


SPRUNG TAILWHEEL

This modeler made a sprung tailwheel from music wire, brass strip and wheel collars. He first soldered the bottom collar and tiller arm to the wire. After inserting the leg through the bushing (shown with a dashed line), he added the top collar. For models weighing around 13 pounds (6 to 7kg), 0.093-inch (2.5mm) wire works well.

R. Kenneth Jenkins III, Washington, D.C.

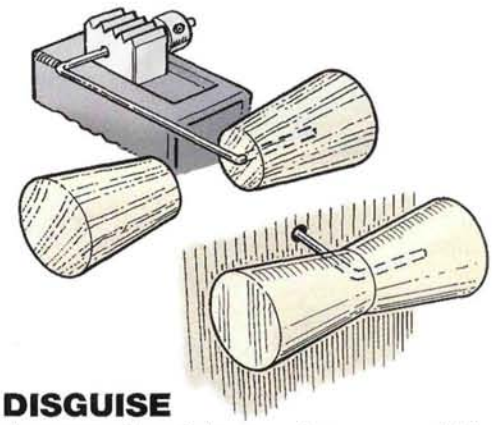




'NOTHER PLAN HANGER

Four key rings—two of the hinged variety—through a wooden batten make a simple plan hanger. Staple the plan to the batten. You can also store your plans this way, just as they were stored in drawing offices (before CAD!).

Arthur Villa, Amherst, MA



IN DISGUISE

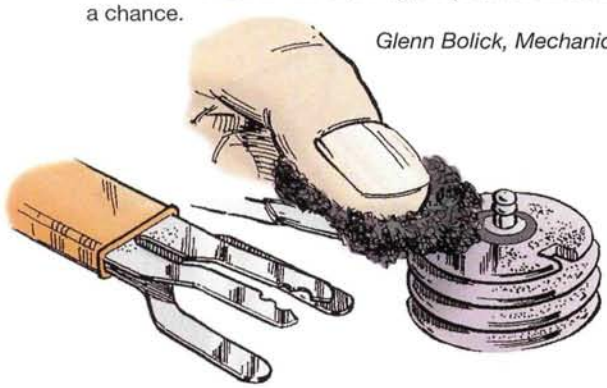
Disguise your radio switches as antennas, gun sights or steps. This modeler's switch has been disguised as a venturi, often seen on the side or belly of older light aircraft. You can make it from dowel and wire, then mount it through the side of your scale or sport model. Be sure to set the switch to Push for On since it would be easy to push the switch off when launching! Use a simple lock to prevent it from being pushed on while you're transporting the model. (See Dennis Bryant's tip, September '99.)

Sean Levatino, Troy, NY

GOOD CONNECTIONS

Keep the top of your Cox or similar glow heads bright and shiny by giving them an occasional rub with steel wool or a Scotch-Brite scouring pad. Otherwise, the grayish aluminum oxide starts to act as an insulator and slows or even stops the flow of current to your plug element. Polish the glow clip, too. Get that corrosion off, and give your hard-working Ni-Cd a chance.

Glenn Bolick, Mechanicsville, VA



PILOT PROJECTS

A look at what our readers are doing

CANADIAN DE HAVILLAND

This 72-inch de Havilland DHC-2 Beaver, built by Henry Simon of Bobcaygeon, Ontario, Canada, flies the local colors with pride. It sports the colors and call letters of the first Beaver to roll off the assembly line for the Ontario Provincial Air Service. An O.S. .52 4-stroke ensures that the balsa and fiberglass floats on this 6.75-pound Unionville kit aren't always in use.

TOPNOTCH TEMPEST

This exceptionally detailed Hawker Tempest has a handmade cockpit, a sliding canopy and 26,287 simulated rivets! No wonder it took Emerson Melton of Brooklyn, NY, two years to complete. Emerson built the 83-inch, 1/6-scale Tempest using a semi kit by Sepp Uiberlacher. The model features pneumatic retracts with sequencing doors and a retractable tail wheel. This 22.5-pound warbird is powered by a Moki 1.8 spinning an 18x8 prop.

SCALE RACER

E. Paul of Rio Vista, CA, built this 1/4-scale Curtiss R3C-2 Racer from scratch using Don Smith plans. Finished in Super Coverite and Ace enamel paint, the 66-inch, 21-pound plane is powered by a G-62 turning a 20x10 Master Airscrew Scimitar prop. He has a set of floats in the works for this balsa and plywood model, and he plans to build more float racers from the '20s.

SEND IN YOUR SNAPSHOTS. *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

DEBOLT T-CRAFT

Ward Riffe of Sun City, FL, a lifelong full-size aircraft pilot but a novice RC modeler, wanted a plane that would fly like a trainer while he learned and that would also be capable of aerobatic maneuvering once he mastered the basics. Ward scratch-built his T-Craft from 20-year-old plans designed by Hal deBolt (left) and sold by *Model Airplane News*. This .40-size model provides an easy entry into aerobatics and proves that good design is timeless.

BALLFIELD FLYER

Joseph Cacciotti of Spring, TX, fondly displays his Miss 2 Electric, built from Hobby Lobby's kit. Joseph has been building since 1939 and really likes the convenience of electrics. The closest club fields are 40 to 50 miles from his home, but that's no problem for his Miss 2, which he says "is great at ballfields." The affordable kit has a 54-inch span and weighs about 30 ounces.

TAG-SALE TREASURE

Harry Jenkin of Neptune City, NJ, found this partially built PT-19 Sterling Kit at an antiques auction and snapped it up for $20. He completed the 65-inch biplane—even adding a wing walker for a nostalgic touch. Harry covered his model with silk and dope and powers it with a vintage Veco .61.

DOUBLE YOUR FUN

Charles Neidir of Fairfield, CT, enjoyed his 1/3-scale Ace Extra 230 so much that he built a Sig Somethin' Extra kit to look—and fly—just like it. Both are covered in Ultracote and use a 6-channel Futaba radio. The big plane is powered by a Sachs 4.2 engine, and the little one uses a GMS .51.

READY TO STRIKE

Airbrushed camouflage doesn't stop this beautiful P-39 Airacobra from standing out. Rod LeMense of Ketchum, ID, built it from a Top Flite kit, covering it in MonoKote with a clear coat of epoxy finish and Formula U paint for the camouflage. The model is powered by a Super Tigre .61 with a Pitts-style muffler, both of which are hidden under the customized cowl.

BATTLE OF BRITAIN SQUADRON

This beautifully rendered threesome was built by Mike De Petrillo of Schenectady, NY, and represents a typical German attack unit from the Battle of Britain. The lead Stuka is a Ju 87-B kit from Aerotech Intl., powered by a Magnum .91 4-stroke and covered in MonoKote. Flying escort are two Messerschmitt Bf 109Es. The gray and olive model (left) is a Midwest kit powered by an O.S. .46 FX and finished in MonoKote with Perfect Paints dull flat clear. The silver and black plane is a Model Tech ARF with Ultracote black camo markings and an Enya .45 engine.

RENOVATED RACER

The job that Billy Langford of El Dorado, AR, did on this beautiful antique Coverite Gee Bee Model E is even more remarkable, given its condition when he received it. Stored for years and ravaged by rats, it took Billy many long hours to repair the partially-eaten stab, wing ribs and wingtips. Now Billy's model sports a K&B .40 engine and Futaba radio gear.

MODEL AIRPLANE NEWS
READER'S
GALLERY

Nick Ziroli Jr.'s Grumman TBM Avenger

by Gerry Yarrish

The Grumman TBF-1 Avenger (TBM-1 when built by Eastern Aircraft division of General Motors) was a torpedo bomber specially designed to operate from the deck of an aircraft carrier. The impressively large aircraft (with a span of 54 feet, 2 inches) carried three crewmen—the pilot, radio operator/under-gunner and the rear gunner. Powered by a 1,600hp, 14-cylinder radial air-cooled Wright R-2600 engine, the Avenger's maximum speed was 270mph at an altitude of 7,500 feet. The aircraft's most recognizable feature was the large bubble turret adjacent to the aft canopy that housed the rear gunner; a smaller under-gun area was positioned below the tail, just aft of the full-length bomb-bay doors. Inside, the bomb/torpedo bay had space for either a standard 22-inch-diameter naval torpedo or the equivalent weight in standard fragmentation bombs. Since it was a carrier-based aircraft, the Avenger was equipped with folding wings that pivoted backward as they folded inward.

Builder and designer of the Avenger, Nick Ziroli Jr. (third from left) poses next to Nick Sr. and some supportive friends at the 2000 Top Gun.

SPECIFICATIONS

Model: Grumman TBM Avenger/Tarpon Mk. 1

Type: torpedo bomber

Scale: 1/6

Wingspan: 108 in.

Weight: 45 lb.

Power used: Eagle 4.2ci

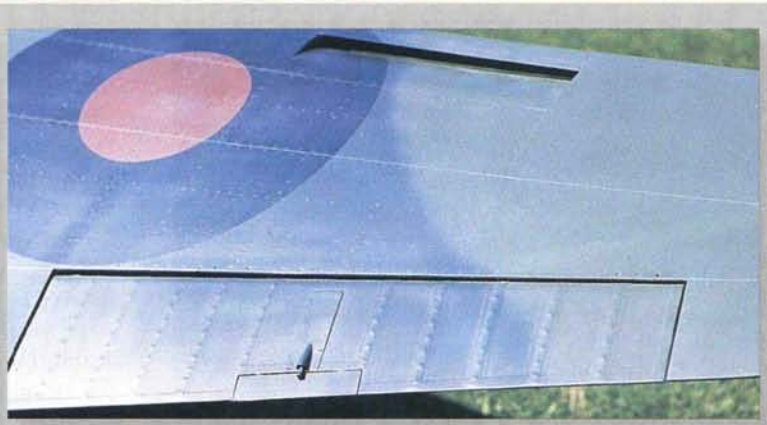
Prop: 24x10

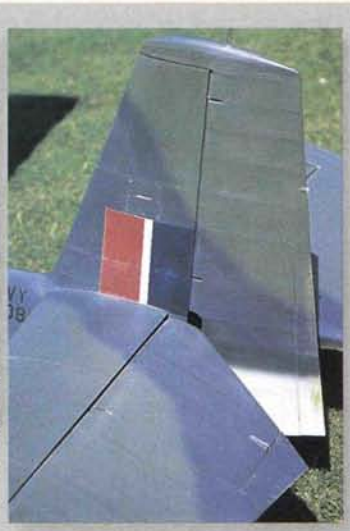
Radio used: 10-channel Airtronics Infinity 1000

Time to build: 9 months

Comments: Nick's model placed second in Designer Scale at the 2000 Top Gun scale invitational and earned the Critics Choice award.

Left: the dummy radial engine and static-display prop both hide the Eagle 4.2ci gas powerplant and add much to the model's scale appearance. ■ Center: close-up of the rear gunner's bubble turret. Note the scale handhold on the side of the fuselage. ■ Right: the retractable landing gear are custom-made units from Robart Mfg. Note the open torpedo/bomb-bay doors and internal door details.





Left: all the control surfaces have scale hinging and are fabric-covered, complete with rib stitching and pinked reinforcement-tape details. ■ Center: the wings are equipped with slats just like those on the full-size aircraft. Note the flush rivet detail on the surface of the wing. The ailerons are nicely detailed, including the trim tabs. ■ Right: close-up showing rudder and vertical fin; note inspection panel detail.

GRUMMAN TBM AVENGER

NICK'S TARPON

When operated by the British Fleet Air Arm Services (Royal Navy), the Avenger was referred to as the Grumman Tarpon Mk. 1, and it is this variant of the aircraft that noted scale builder and competitor Nick Ziroli Jr. chose to compete with at the 2000 Top Gun scale invitational.

Before building the Tarpon, Nick had successfully competed many times with the prototype 1/6-scale Avenger that he designed and built for the 1997-1998 scale circuit. Nick had incorporated into the wing a scale operating pneumatic driven wing-folding mechanism. Impressive, but the penalty for its use was having to fly a model that weighed more than 50 pounds! After retiring the original model, Nick decided to build the Tarpon without the folding-wing feature, and in the process, he produced an even more impressive-looking torpedo bomber that weighed 5 pounds less! Since the Tarpon has the same wing area and engine, Nick is very pleased with the new model's performance; a lighter wing loading is always a good thing!

The 108-inch-span model has a fiberglass fuselage and built-up, plug-in wing panels; the panel seams are at the scale fold lines. The retractable main landing gear are from Robart Mfg., while the tailwheel and the retractable tailhook are scratch-built. The model is expertly finished and weathered with automotive acrylic lacquer paint that was matched to Federal Standard no. 595B color chips. Power for the Tarpon comes from an Eagle 4.2ci gasoline engine turning a 24x10 prop, and Nick uses an Airtronics Infinity 1000 10-channel radio for control. It's a torpedo bomber, so it's only natural that the model is equipped with a droppable torpedo and has a fully enclosed bomb-bay area. The bifold doors are hinged lengthwise along their centers with miniature piano hinges from Nelson Hobby Specialties, and the doors are pneumatically driven.

Nick placed second in Top Gun Designer Scale—less than 1.9 points behind winner Jeff Foley. Nick also won the 2000 Top Gun Critics Choice award for his outstanding efforts. I think you will agree that his awards are well deserved.

If you'd like to build your own Tarpon/Avenger, Nick tells us that a plan for an all-wood version will be available soon along with a fiberglass fuselage option. A formed canopy, gun turret and engine cowl will also be available.

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

GLOBAL HOBBY DISTRIBUTORS

Blue Max

by Chris Chianelli

FLIGHT PERFORMANCE

With a crisp, cool day, a well-broken-in engine, an orange scheme that could be seen a mile away and a wing loading of 16.95 ounces per square foot, this had to be one of the least stressful first flights I've ever had.

• TAXI AND TAKEOFF

The antique flavor of the Max is carried throughout the entire design—well, almost. Global opted for a functional tailwheel instead of a tail skid, which would have been more vintage, and I'm glad it did. Accordingly, the model handles quite well on the ground, except in gusty conditions. Turning into the wind, the model has a tendency to tip when coming crosswind, but this would hold true for most antique designs; they really shouldn't be flown in overly windy conditions, anyway.

During takeoff roll-out, the rudder is very effective; the Max lifts off with almost no elevator input leaving you to concentrate on rudder and aileron inputs as the model gains speed and altitude.

• AEROBATICS

With control surfaces set up radically, stunt-flying the Blue Max is less like doing aerobatics and more like a flying circus event—a very special kind of fun. Will it do axial rolls? No. Will it spin? Barely, and only to the left. Will it fly inverted? I never tried to, and probably never will. But it will flip and twist and recover instantaneously, all within the smallest box you've ever known. That's what happens when you ask more than 750 square inches of flat bottom lifting surface to carry only 5½

The Blue Max certainly brings out the kids—the kids in all of us. Copilot: Colin Post.

You wanna have fun?

You know what's kept me in this great hobby for almost 30 years now? Having fun, that's what. It's every bit as fresh for me today as it was in the summer of '71 because I've always focused on having fun with the hobby. I can have fun wringing out a large aerobatic machine, rallying with my Ziroli "Jug" at a scale warbird meet, or just relaxing with a slow flyer in my front yard. Sometimes, though, I want to go over the top with the fun factor, and that's what models like Global Hobby Distributors'* Blue Max are created for. The guys at Global are known for offering products aimed at fun-lovers (anyone remember "the Real Thing"?), and the Blue Max is the best yet at delivering a smile. And for me, that's what it's all about. When the hobby stops bringing a smile to my face, that's when I quit!

pounds. This thing is an "LOL" machine for sure—and that's how it was designed. Use lots of coordinated ailerons and rudder with this one for either tight-turn hot-rodding or for smooth, scale-like turns.

• LANDING

You want slow flight? You found it. This model literally crawls back down to the ground for the slowest touchdowns imaginable. And with the highly visible bright orange finish, the rank beginner can learn to land with this design, provided the controls have been set up for minimum throws. Moreover, the Blue Max is great for teaching a beginner some good habits—such as using the rudder together with ailerons—right from the start. Before you know it, he'll be adding more and more control throws, yawing the Blue Max 180 degrees within its own length and yelling out "Where's Waldo?"

SPECIFICATIONS

Manufacturer: Global Hobby Distributors

Model name: Blue Max

Type: sport/antique

Length: 49.5 in.

Wingspan: 67.25 in.

Wing area: 756 sq. in.

Weight: 5 lb., 9 oz.

Wing loading: 16.95 oz./sq. ft.

Engine req'd: .40 to .60 2-stroke; .52 to .70 4-stroke

Engine used: Magnum .52 4-stroke

Prop used: Zinger* 13x5

Radio req'd: 4-channel w/4 servos (aileron, rudder, elevator, throttle)

Radio used: JR* XP652

Fuel used: Wildcat* 15% (14.4% synthetic, 3.6% castor)

Features: built-up all-wood ARF; slab-side forward fuselage with built-up aft section. Wing is D-tube type construction with false ribs for enhanced antique, "scale" appearance. Kit includes: beautiful vintage, all-metal, wire wheels; fuel tank; steerable tailwheel and complete hardware package.

Comments: a refreshing and fun twist for a 4-channel sport/trainer. Unbelievably forgiving flight characteristics yet will perform tight, barn-storming-style maneuvers if control throws are increased.

Hits

- Excellent instruction booklet.
- Good parts fit and good-quality wood.
- Excellent flight characteristics and in-flight visibility.
- Extremely high "fun factor."

Misses

- Landing gear and pushrod wire is brittle (see text).
- Poor fit on pilot and cannon plastic parts.

Not only is this model zany, easy to see in flight and an excellent flyer, but the package is also topped off with antique charm. Check out those leading-edge false ribs and beautiful, all-metal, spoked "bicycle" wheels. Moreover, though the Max is fairly large (it has a 67-inch wingspan), it can be tightly maneuvered—kind of like a large "park flyer," if you will.

THE KIT

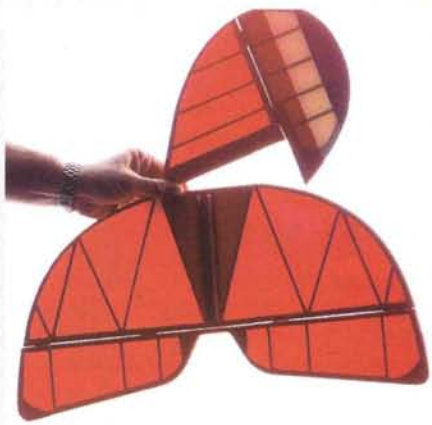
Everything you'll need except a radio, an engine and some glue comes in the box. Four samples were sent to the *Model Airplane News* office, and three of those were sent out to be built by various modeler-contributors. Two of them used all the hardware in the kit and had no problems except for some brittle wire used in the landing gear. One other reviewer and I did replace linkage wire because we felt it might be brittle, too. Yes, this is a large model, but the demands put on the linkages are not as great as you might think because it flies so slowly, and those who used the stock control linkage had no problems. It's hard to please everyone when it comes to control linkages, partly because so much personal preference is involved. Some fliers like clevises; others like snap keepers or Z-bends—whatever makes you comfortable. I found everything in the kit to be quite usable. The wire landing gear in two of the three kits did crack on hard landings, but I've discussed this problem with the guys at Global, and they reassured me that the problems have been addressed.

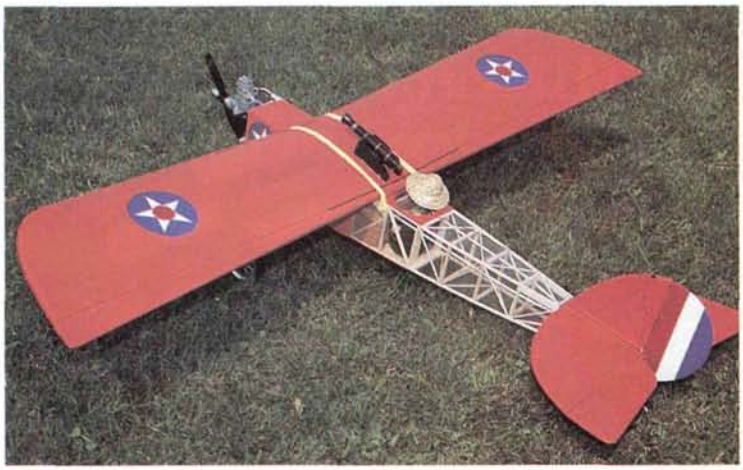
All balsa and plywood structures were made from good-quality materials and were very well assembled. Fuselage open structure is made from square balsa stock and not only adds even more antique appeal but is also part of the reason for the Blue Max's light weight. How does a wing loading of 16.95 ounces per square foot grab you? That's why this large model can almost turn around its own yaw axis without losing altitude.

For $189.99, you really get a lot, especially when you take a close look at the included wire wheels. Those things alone are worth 40 to 50 bucks. Some wire wheels sell for well over $100!

Contents of the box.

Using more solid-slab balsa components would have made the Blue Max cheaper to manufacture, but Global went for light weight instead. The Blue Max structure is open and built up wherever possible. In the flight shot taken from below, you can see the entire "skeletal" structure of the Max; even the vintage false ribs are visible. This more complex framework pays off with a super-light wing loading of 16.95 ounces per square foot. Wing loading is everything.





ASSEMBLY

The 26-page instruction booklet is very clearly written, plus it contains 59 photos for visual support. Assembly goes very smoothly—except for the pilot and cannon. The pieces are too thin and are difficult to assemble, and the pilot doesn't fit easily into the cockpit. Normally this would be a more serious miss, but we all thought these items were a bit too silly for some and probably might not be used anyway. We've since replaced them with Williams Brothers'* pilots and machine guns; much better looking, in our opinion.

One of the three kits had a problem with a tight aileron torque rod that required cutting into the trailing-edge stock to remove some excess glue that was causing the binding. Other than that, assembly on all three kits went well, just as outlined in the instructions.

POWER

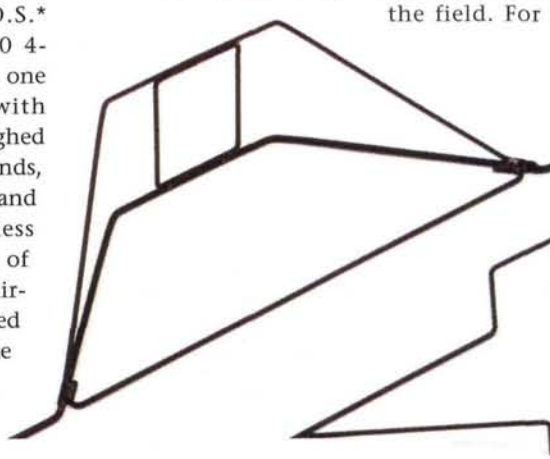
At a finished weight of 5 pounds, 9 ounces (with the Magnum* .52 4-stroke) supported by 756 square inches of wing area, any .40 2-stroke is plenty of power for the Blue Max. Personally, this design screams out "4-stroke" to me, and all three samples were equipped with one. Mine was equipped with a Global .52; the other two had O.S.* .52 and .70 4-strokes. The one equipped with the .70 weighed in at 5 pounds, 12 ounces, and was—needless to say—way over-powered. Because of the higher drag with this type of aircraft, I opted for a more finely pitched prop than I usually do with a 4-stroke and settled on a 13x5 after my .52 had been broken in. I'm going to try a 14x4 some time in the future, but I do think a 13x5 is just about right. Oh, yes; the model needed no nose weight with either of the 52s.

CONCLUSION

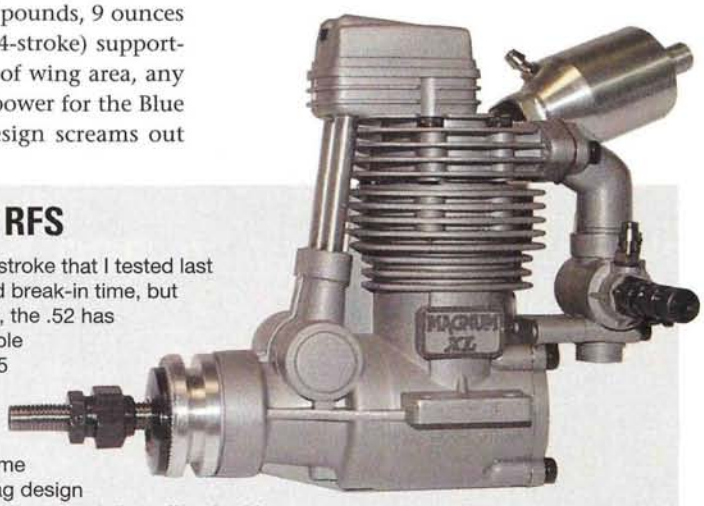
Oftentimes at the field, I notice that modelers break up into several groups. The aerobatic guys, scale guys, fun-flyer guys, whatever, are attracted to each other, and understandably so, by a common interest. A model like the Blue Max, on the other hand, crosses all lines and brings all modelers together. Why? Because it's fun and versatile. With its extremely light wing loading, high visibility and "reverse-taper" wing, the Max makes a great trainer that doesn't look like every other trainer on the field. For the experienced guy, the Max can be set up with radical control throws for close-in barnstorming from a lawn chair. Or, you can put it on floats and take it with you on vacation; it's that kind of airframe. And if you want to fly it someplace where silence is a prerequisite, *Model Airplane News* contributor Tom Hunt has done another of his electric conversions with the Blue Max I sent him, and he states, "This thing is perfect for electric power." We'll have Tom's complete conversion review in an upcoming issue.

Whether as a trainer, a barnstormer, a vacation plane or an electric, the Blue Max comes through in every situation by making people smile.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✚



Have you ever priced vintage metal wire wheels? We're talking sticker shock here. Global gives you these with the kit. As you can see from the static shot, they add so much antique appeal. They're big, too; about 4 inches, and good for rough fields. The wire gear and nose skid, while accurately bent, were made of a too-brittle metal, but Global has since taken care of this.



Magnum XL-52 RFS

Like the Magnum .30 4-stroke that I tested last month, the .52 required break-in time, but since this was completed, the .52 has proven a strong and reliable engine. I settled on a 13x5 prop that was tached at 8,950. Although I am going to experiment with a 14x4 some time in the future, this high-drag design certainly doesn't need the increased disc-effect braking offered by a larger diameter prop. I'm sure I'll find the 13x5 to be best.

The engine idled easily at 2,500rpm, helped by the excellent fuel-metering qualities of the two-needle Magnum carburetor, the larger diameter prop and my first choice of glow plug for all 4-strokes: an O.S. "F."

Of course, other 4-strokes—a Saito .56, Enya .53, O.S. .52 or Thunder Tiger .54—would also be perfect for the Blue Max.

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

Profile fun-fly models—your choice—ARC or ARF

THUNDER TIGER

Fun Tiger Extra & the Giles 202

by Rick Bell

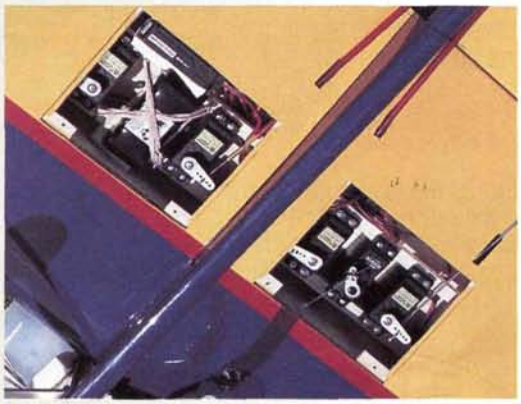
Fun-fly airplanes, especially profile fun flys, are at an all-time high in popularity. Designed to loop, roll and tumble with the best of them, fun-fly aircraft have the added advantage of being relatively fast to build. For competition and everyday sport flying, replacing the model's built-up, box-structure fuselage with a simple flat profile simplifies the model's structure and speeds construction. A thick, fully symmetrical airfoil allows good slow-flight behavior and spirited aerobatics. Now, make the model an ARF/ARC, and you have the newest fun fly offering from Thunder Tiger.*

When editor Gerry Yarrish offered me the chance to review one of the two new Thunder Tiger profile fun-fly planes, I chose the almost-ready-to-cover (ARC) Fun Tiger Extra ARC so I would be able to cover the model myself. Gerry built the Giles 202 ARF. For power, we both used the Thunder Tiger Pro .46 engine to see how the two models would compare.

CONTENTS

Both kits' complete hardware packages include all nuts and bolts, hinges, pushrods, horns, clevises, fuel tank, landing gear, wheels and spinner. All airframe parts are packed in plastic bags to protect them from shipping damage. The instructions provided with the ARC Extra are the same as for the ARF version, but this does not hinder assembly. Using the inventory list given in the instructions, I checked for missing parts; there weren't any.

The wings are of typical D-tube construction and have vertical shear webbing to resist twisting. The nicely built profile fuselage is like a hollow-core door; it's built using lite-ply sides and a balsa core. The well-constructed tail feathers and ailerons are built of balsa sticks.



The only modification I made to the Fun Tiger Extra was to move the radio hatches to the bottom of the wing for a cleaner overall appearance.

ASSEMBLY

After reading the instructions, I decided to cover the model after I had assembled all the major components. This would allow me to install the radio equipment, pushrods and engine more easily and would speed up final assembly.

I first located the paper drilling template, cut it out and taped it to the front of the fuselage. With my drill press, I then drilled the holes for the landing gear and fuel tank. I then installed the Pro .46. The tailwheel bracket requires the drilling of two

Giles 202 ARF

by Gerry Yarrish

At fun-fly competitions, where you sometimes push your model (and yourself!) to complete maneuvers as fast as you can, you really don't want to compete with your favorite, fully built-up model. Thunder Tiger must have known this when it introduced these two fun-fly models, and I consider both of them perfect for the task. The Giles 202 ARF requires only a couple of evenings to assemble: that's about all the time you want to invest if you intend to fly aggressively at a fun-fly event.

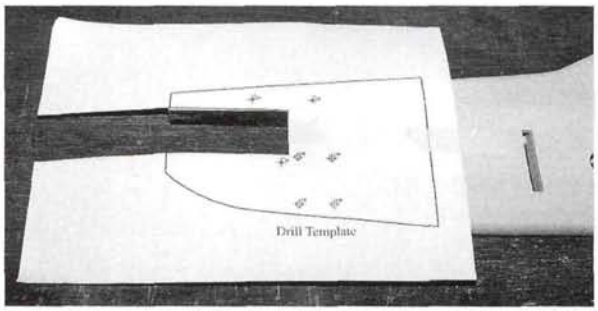
Out of the box, the Giles ARF comes with all of its major components built and covered with a preprinted, stick-on film. The instructions are easy to understand and well illustrated with photos. I attached the wing and tail feathers to the fuselage with 15-minute epoxy. The included hardware is good, and I used everything that came with the kit. A drilling guide for the landing-gear and fuel-tank-attachment bolt holes is included, and this made drilling the holes a quick proposition: simply tape the pattern to the model, place it flat on the workbench, and drill straight through the fuselage.

Installing the engine is just as easy, and to make the holes square with the engine mount, I drilled these with my drill press. In just a couple of hours, I had the model assembled and the engine, tank and landing gear installed and ready for radio installation.

RADIO SETUP

For control, I use my JR 8103 TX and a 1000mAh RX battery pack and standard NES-531 servos for all the control surfaces. To get the most out of any fun-fly model, you have to do some basic program mixing. This entails switching from the normal wing mode to flaperon mode and then activating the "elevator to flap" (E/F) mix. This is easy with the 8103 TX and requires the use of two aileron servos and that you attach the second aileron servo to the appropriate auxiliary channel (aux. 2, flap) with the JR radio.

For the first flight, I added 30-percent exponential to the elevator and aileron channels. I started with 20 percent E/F mixing, and this felt about right for my type of flying, but 30 percent produced better-looking tight loops.

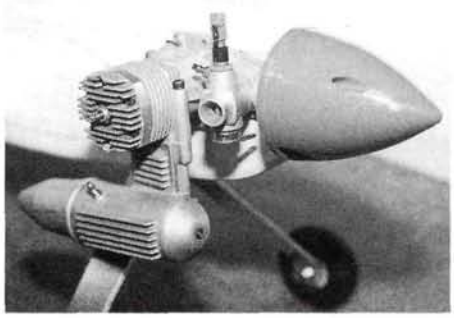


A full-size paper drilling template is included in the kit; it makes locating and accurately drilling the holes in the fuselage very easy.

holes in the fuselage for the bracket's barbed-pin mounts; for extra security, I used two wood screws to hold the bracket in place. I then sanded the fuselage to make it ready to cover.

Two plywood wing joiners are used to attach the wing panels to the fuselage. I laminated the two-part joiner pieces together using Anchor Bond* 2-hour epoxy. While the epoxy cured, I built the wing hatches using the provided balsa; I then used the paper template to determine the correct positions for the wing's pushrod slots so I would be able to cut them out.

To attach the wing panels to the fuselage, first insert the wing joiner and an alignment dowel into the fuse and slide the wing halves into place. After seeing the wing in place on the fuselage, I decided to switch the panels around on the fuselage so the hatches would be on the bottom. Since the airfoil is fully symmetrical, this works very well, and the wing halves still fit tightly against the fuse. As a reference for covering later, I traced the outline of the wing airfoil on the fuselage. I then fitted the fin and stabilizer to the fuselage and marked where the covering would have to be removed. The hinge slots are precut, so very little effort is needed to complete the task. I did not glue the hinges into place until I had covered everything. To increase control throw, I sharpened the V-shaped leading edges on all of the control surfaces.



The Thunder Tiger Pro .46 is a powerful engine that provides more than enough power for the fun-fly model. With a profile airplane, engine installation and adjustments are a piece of cake.

SPECIFICATIONS

Model: Fun Tiger Extra ARC/Giles 202 ARF

Manufacturer: Thunder Tiger

Type: profile fun-fly

Wingspan: 47 in.

Wing area: 696 sq. in.

Weight: 4 lb., 1 oz.

Length: 43 in.

Wing loading: 13.54 oz./sq. ft.

Radio req'd: 4-channel w/5 servos (ailerons, rudder, throttle and elevator); computer radio recommended for flaperons

Engine req'd: .40 to .50 2-stroke; .65 4-stroke

Engine used: Thunder Tiger Pro .46

Street price: $99.99 ARC/ARF

Features: available ARC (Fun Tiger Extra) and ARF (Giles 202), these kits are highly prefabricated and light and have all their components built and sanded. The kits come with complete hardware packages that include pushrods, horns, clevises, landing gear, fuel tank, etc.

Comments: these profile fun-fly airplanes require minimum simple assembly and will get you quickly into the air. They can perform wild 3D maneuvers and anything else you can think of, and they make great aerobatic trainers.

Hits

- Good lightweight construction.
- Easy and quick to build.
- Easy to fly.

Misses

- Decals aren't included.

PERFORMANCE REPORT

With all its control throws set according to the instructions, the Giles is a ball to fly. At full throttle, you can blast off and climb to maneuvering altitude in a hurry. That's good at a timed event where you take off, do five loops, five rolls, five spins and then do a spot landing while "on the clock."

Loops with E/F mixing on are very tight, but don't be tempted to dial in too much mix percentage; with too much flap deflection, the model "over-pitches," and you end up with a bad-looking tumble instead of a round loop.

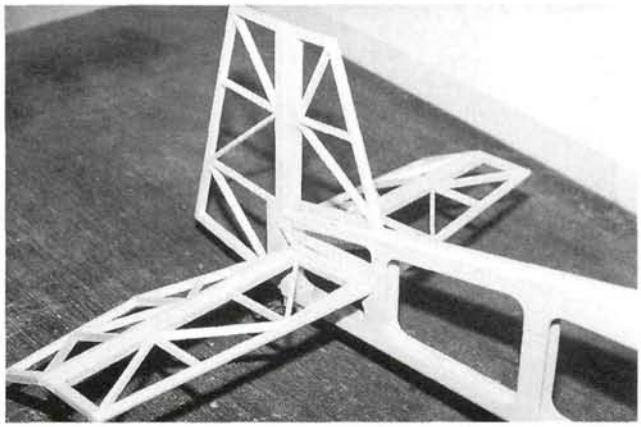
For around-the-patch sport flying, spins are very satisfactory. I feel that the model spins better without E/F mix activated, but I don't consider myself a topnotch fun-fly competitor. It all depends on your style of flying.

Slow speed and landings are the best cards the model deals out. With its thick airfoil, the Giles doesn't pick up excessive speed, and with a little throttle added during the approach, you can nail spot landings all day long. When you have to fly slowly, such as when you're carrying a bomb at a bomb-drop event, the model remains solid in roll and very stable in pitch. Rolls at slow speed can be very fast, and if you're not used to this or don't like the feel, you can kick expo as high as 50 percent and still have complete control.

For sport flying and competition fun-fly events, I like the Thunder Tiger Giles 202 ARF very much. The only change I would like is for the kit to come covered in "real" iron-on covering such as MonoKote or Ultracote—not in the stick-on stuff that's difficult to repair. If you want to have an edge at the next club fun-fly picnic or you just want to practice hot-shot maneuvers, give this one a try; you'll like it, too!

Hits
- Easy to assemble.
- Good flight performance.

Misses
- Preprinted, stick-on covering is difficult to repair.



I attached the tail surfaces to the fuselage before I covered the model so I would be able to hook up the controls and see where the covering would later have to be removed. I then removed the surfaces and covered them separately.

To finish the fuselage assembly, I installed the tank, bolted the landing gear and wheels into place and attached the engine. The next step in the instruction manual is to glue the wing halves and tail feathers to the fuselage. Instead, I temporarily tack-glued them into place so I was able to install the servos and the pushrods. I used a JR* 600-series RX and a JR 600mAh battery pack. I also mounted the RX switch on the top of the right wing instead of on the wing hatch. I checked the control direction, set up the high- and low-rate surface deflections and then removed all of the radio gear and the rest of the hardware so I could cover the model.

COVERING AND FINAL ASSEMBLY

I carefully removed the wing halves and tail feathers and gave everything a final sanding. I covered the model with CGM* Ultracote dark yellow and scraps of MonoKote* for the red and blue trim. The kit doesn't include decals, so my good friend Bob Hastings made an impressive set of graphics for me on his Stika* vinyl-cutting machine.

EXTRA ARC FLIGHT PERFORMANCE

Before the first flight, I ran several tanks of fuel through the Pro .46 to break it in and to set the needle valves. After that, it was hurry up and wait for the weather to cooperate.

• TAKEOFF AND LANDING

Takeoffs are very simple: point the nose into the wind, advance the throttle, and you're airborne before you know it. Actually, you need only about ½ throttle to get off the ground. Full throttle makes it look as if the plane is being launched from a catapult! Standard landing approaches are easy, but with a little wind and quick reflexes, the Fun Tiger Extra can be brought down like a helicopter! Zero-ground-speed landings are a blast!

• LOW-SPEED PERFORMANCE

Slow flying is as much fun as it can be! With its big, thick airfoil, this plane can fly very slowly under complete control. It's very stable, and low-speed aerobatics are easily done. A steady wind to play with adds fun to low-speed flying.

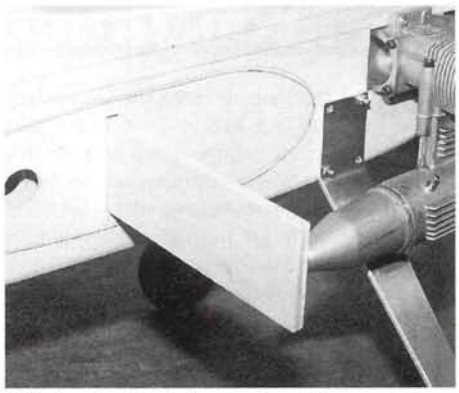
• HIGH-SPEED PERFORMANCE

The instruction manual recommends against full-throttle straight and level flight to avoid control flutter; I agree! Limit your full-throttle flight to vertical maneuvers.

• AEROBATICS

What a great plane to sharpen your flying skills with! Can you say "fun"? Fuselage-length loops and rolls happen faster than the blink of an eye. Aerobatics are second nature to this plane. The model can handle with ease rolling circles, knife-edges, snaps, spins and anything else you like. The plane is equally at home in upright and inverted flight.

FUN TIGER EXTRA & THE GILES 202



This beefy wing joiner and an alignment an dowel provide a strong attachment for the wing panels. Use slow setting epoxy to ensure ample time to ensure that the wing panels are properly aligned with the fuselage and with each other.

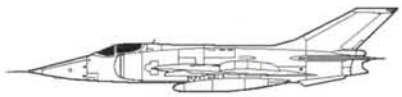
After covering the model, I went back to the beginning of the instructions and assembled the Extra following the ARF kit's steps. I cut out all the openings and removed the covering above the drilled holes and where a wood-to-wood bond would be necessary. I then glued in the hinges and epoxied the wing joiner and wing-alignment dowel pin into the fuselage. I epoxied the wing panels to the fuselage, making sure they were on squarely and properly aligned with each other.

After the epoxy had cured, I mounted the landing gear and tailwheel assembly. Then I epoxied the stabilizer and vertical fin into place and installed the engine, muffler, fuel tank, fuel lines, servos and pushrods. Because I had already mounted all of the subassemblies, the final assembly took only a few minutes. To balance the plane, I had to add only 1 ounce of lead to the nose.

FINAL THOUGHTS

I'm impressed with the Fun Tiger Extra, which is my first profile fun-fly ARC airplane. It is well constructed, and its assembly is logical and quick to do. Even though I could have covered the model in any way I pleased, I must admit that I liked the photo on the box and covered the Extra following almost the same pattern. Capable of many aerobatic maneuvers, the Thunder Tiger Fun Tiger Extra is a real hoot!

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*



MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

FALCON TRADING

Carosel

Precision-molded sport plane with performance

by Keith Palmer

The Falcon Trading* Carosel is an aerobatic ARF model that sports a narrow canopy and racing pilot, Formula One cheek cowls, a long wing with a symmetrical airfoil and scale-looking tail feathers. With its cool graphics and sporty looks, it will be the center of attention at any flying field.

The airplane is molded out of sturdy ABS plastic and has fiberglass-reinforced bulkheads and a foam-core wing with ABS plastic molded over it. The control surfaces are hollow and are hinged in the mold. This saves a lot of work and ensures a very narrow gap at the hinge line. Although you can fly the carosel as it comes out of the box, you can also dress it up by painting it. Thanks to the accuracy of the molded parts and excellent written instructions and photographs, it takes longer to paint the Carosel than to build it (about a weekend or a week of evenings).

ASSEMBLING THE CAROSEL

The instructions suggest that to help the glue bond, you should lightly sand all the surfaces that will be glued together. I used Great Planes* CA for almost all of the construction; for the wing center section and the engine mount, I used slow-curing Great Planes epoxy. The instructions suggest that you remove any mold-release agent that may be left on the surfaces to be painted by lightly sanding them with 400-grit wet/dry sandpaper.

• **Fuselage.** Choosing which of the two supplied mounts would fit my engine, an older HB .61, was my first step. Then I glued the nose ring into the front of the fuselage. The nose ring has molded-in tabs that you can use to position the engine-mount platform. After I had mounted the nose gear on the firewall using two gear guides that are screwed into molded recesses in the firewall, I inserted the firewall into the fuselage with the engine-mount platform. The platform fits into two notches that are molded into the nose ring and the firewall. When I was satisfied with the assembly, I tack-glued the parts into place with thin CA, and then I glued all of the seams with slow-curing epoxy.

PHOTOS BY KEITH PALMER & WALTER SIDAS

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

After starting the engine, I taxied the Carosel out onto the runway for takeoff. The main landing gear's wide stance makes taxiing very easy, and on takeoff, the airplane tracks as straight as an arrow. I pointed the Carosel into the wind and slowly opened up the throttle. Some right rudder was needed to keep it straight, and I let it use up most of the runway before I pulled back on the elevator. The Carosel climbed out nice and easy and needed no trim corrections. On landing, I noticed that it did not want to stop flying.

• LOW-SPEED PERFORMANCE

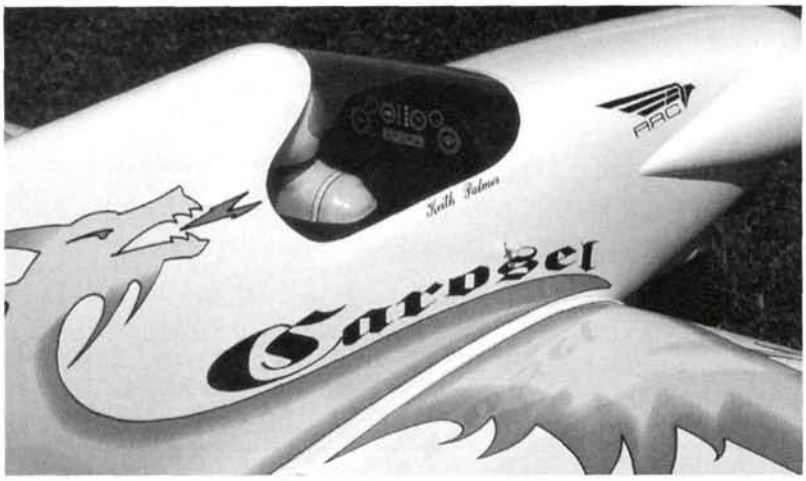
At low speed, the Carosel handles nicely, but the controls become slow, especially the ailerons. The long, 66.9-inch wing is like that of a glider, and the airplane can be slowed down to a crawl without any fear of a sudden stall or a snap roll.

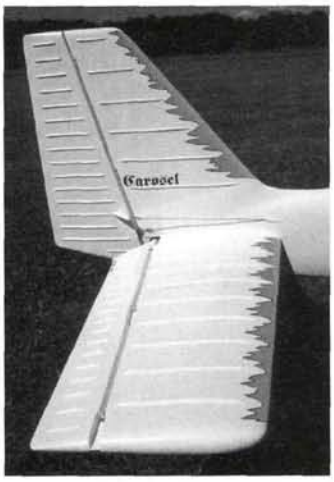
• HIGH-SPEED PERFORMANCE

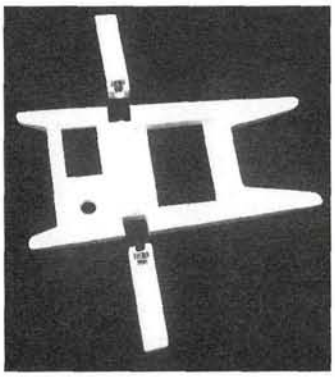
With a good .60 up front and at full throttle, the Carosel is very fast. My 8-pound airplane wouldn't exactly climb out of sight, but it doesn't need more power, considering its high speed when straight and level.

• AEROBATICS

The Carosel will perform most maneuvers very nicely with no nasty surprises. Loops are straight with no helix; rolls are straight; and snap rolls are fairly crisp, considering the length of the wing. The Carosel is a nice flying sport airplane.







Above: I glued the Lexan canopy in place instead of simply screwing it down; this looks better. Top right: the tail surfaces are hollow and are hinged in the mold. Right: the fuselage servo tray and wing hold-down blocks are simply glued into place.

SPECIFICATIONS

Name: Carosel

Manufacturer: ARC (Italy)

Distributor: Falcon Trading

Type: sport ARF

Wingspan: 66.9 in.

Length: 47.25 in.

Chord at root: 12 in.

Weight: 7.7 to 8.37 lb. (8 lb. as built)

Engine: .58 to .65 2-stroke or .70 to .91 4-stroke

Engine used: HB* .61 PDP

Prop used: Master Airscrew 11x7

Radio req'd: 4- or 5-channel

Radio used: Futaba 5 UAP

List price: $194.95

Features: ABS plastic fuselage with many details and assembly notches molded in; foam-core wings with ABS molded around it; the control surfaces are hinged in the mold. The kit comes with all required hardware, including landing gear, wheels, two engine mounts, push/pull cables, wheels, special fuel tank, gluing clamps and two sets of decals. The instructions are clear and well written.

Comments: the ARC Carosel is a very nice .60-size sport plane that has the sleek looks of a pylon racer combined with a pattern ship. The molded parts fit is excellent and the airplane has a nice feel in the air.

Hits

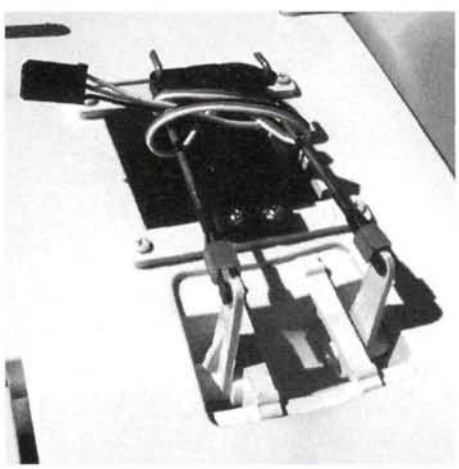
- Quick and easy to assemble—good instructions.
- Excellent molding of all of the ABS plastic parts.
- Control surfaces hinged in the mold.
- Scale-looking ribs and rivet heads molded into the tail surfaces.
- Nice-looking decals (two sets).

Miss

- Lexan windshield cracked around one of the sharper curves.

Gluing in the servo tray and wing hold-down blocks was next. The servo tray fits on top of indentations in the fuselage sides and is attached with medium CA. I snapped the wing hold-down nuts into slots in the wing-mount blocks and then glued the blocks into notches that are molded into the servo trays. To ensure that everything lined up properly, I used the wing spar as a guide.

• **Wing.** I glued the aileron root caps to the inboard edges of the ailerons and then checked the wing spar's fit in the slots in the wing panels. When I was satisfied with the fit, I glued the wing halves and spar together with slow-curing epoxy. I then fit the wing center-section molding to the wing. When I was satisfied with the fit, I roughened the inside of the molding with 180-grit sandpaper before epoxying it to the center of the wing. After I had glued the bolt guide tubes into the two holes in the center of the wing, I attached the aileron control horns to the root caps and secured the ends of the horns with two horn supports. Two aileron servo rails are supplied with the kit, and they are screwed into place over the molded servo well.



Aileron servo installation. Note the molded torque-rod horns.

• **Tail section.** Each elevator half has a cap that you need to glue over the inboard end. The cap that has two control horns for the push/pull control is glued to the left-side elevator. Glue the stabilizer halves together using the nylon molded spar and the molded elevator joiner.

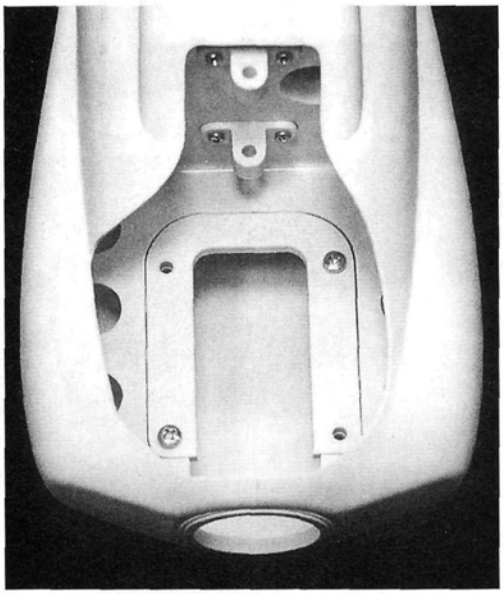
The fin and stabilizer assembly require only that you glue the two rudder horns into the rudder using thin CA.

FINISHING TOUCHES

I bolted the wing to the fuselage using the two molded nylon wing bolts provided. The stabilizer/elevator assembly slides into the rear of the fuselage, and the stabilizer's leading edge is notched to fit into molded notches in the fuselage sides. I found that when all the parts were properly seated in the respective notches, the assembly was perfectly aligned with the wing and the fuselage. I glued the stabilizer assembly into the fuselage with 5-minute epoxy. The fin and rudder assembly fit into a slot in the rear of the fuselage. After ensuring that it was straight, I glued the fin to the fuselage with thin CA.

A very nice racing-style pilot is molded into the fuselage. I painted the pilot and the cockpit floor and then applied the instrument-panel decal. The instructions tell you to screw the Lexan windshield to the fuselage, but I opted to glue it on and to fill the seam between it and the fuselage with epoxy and microballoons. Even so, the windshield developed a small

CAROSEL



Two engine mounts are provided; you choose the one that's best suited to your powerplant.

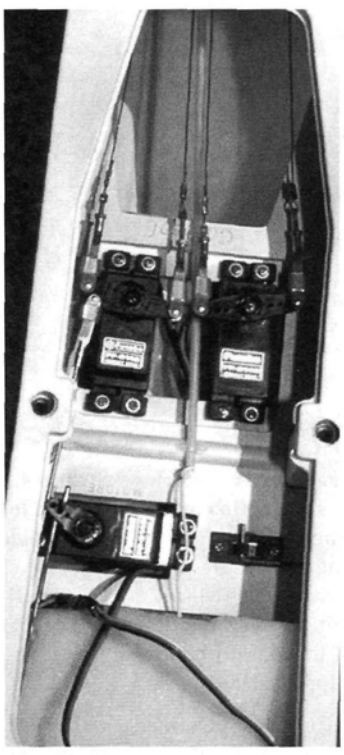
crack around one of its more pronounced curves.

The main landing gear is held in the notches in the main spar by flat washers and self-tapping screws. The nose gear is held in place with the included steering arm. The three very light wheels are held on the axles with nylon retainers. Fairings help dress up the landing gear, and a few drops of thin CA hold them in place.

RADIO AND ENGINE INSTALLATION

The engine mount is secured to its platform with four 4mm screws and nuts. The next step is to place the engine on the mount and attach a prop (I used a Master Airscrew* 11x7) and the included spinner to the engine. I aligned the spinner with the front of the fuselage and marked the engine's screw locations on the mount. (Be sure that there is enough clearance between the front of the fuselage and the back of the spinner.) The engine is held on the mount with four 16mm self-tapping screws. I installed four standard Futaba* servos in the molded servo trays. The aileron servo is in the wing, and the other three are in a tray in the fuselage. The rudder and stabilizer use a push/pull cable, and you should not hook them up until after you've painted the model. All of the required cables and connections are included in the kit.

With everything except the control cables in place, I balanced the model at between 75 and 80mm (a little less than 3 3/16 inches) from the wing leading edge. I was not surprised to find that the Carosel needed 14 ounces of nose weight to balance because it has a long tail and a short nose moment. I mixed some lead shot with slow-curing epoxy and poured it into the engine compartment as far forward as I could get it.



Radio installation; note the pull/pull cable control setup.

DRESSING IT UP

I primed the model with one coat of gray Hobby Poxy* primer and lightly sanded it with 400-grit wet/dry sandpaper. I then applied two light coats of K&B white epoxy and wet-sanded between coats with 600-grit wet/dry sandpaper. The model comes with two sets of decals: red, white and blue racing decals and a fire-breathing dragon. I chose to use the dragon motif because it sets the airplane apart from the other planes at the field and is very visible in the air. The decals are self-sticking and very easy to apply. After applying the decals, I painted the airplane with one coat of Ditzler Delclear auto paint. I then reinstalled the radio, tank and engine and set up the control cables according to the instructions. Control throws are given in the instructions, and I set these up on high rate on my Futaba 5UAP transmitter.

BUILDER'S RECOMMENDATION

The Carosel is a great-looking sport airplane that draws a lot of attention at the flying field. It's quick and easy to assemble and everything except for the glue, paint, radio and engine is included. The Carosel is a lot of fun to fly.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*

KYOSHO SPITFIRE ARF

Beautifully detailed British warbird

by Rick Bell

The Supermarine Spitfire is one of the most elegant fighters to come out of WW II. The Mk.I first flew in March 1936, and the design saw many variations before production ended in 1947. By then, more than 20,000 Spitfires had been produced. The Mk.IX was the most successful version and was produced in the greatest numbers. Now, Kyosho* has produced yet another successful Spitfire with its release of the Spitfire ARF, one of the first in the Super Quality Series of kits.

KIT CONTENTS

When I open a new kit for the first time, I feel like a kid at Christmas. The colorful Spitfire box has many detailed photos—great for reference while building the model. This kit contains a prebuilt, all-wood fuselage, tail feathers and scale-like wing halves. All come covered in matte-finish three-color camouflage and are highly detailed with panel lines, roundels and squadron markings. The vertical fin is built into the fuselage, and that reduces construction time. The kit also includes the fuel tank, fixed main gear, wheels, fiberglass cowl, clear canopy, engine mounts, materials for pushrods, illustrated instruction manual, assorted vacuum-formed parts and a complete hardware package. A supplemental sheet clarifies some points of assembly.

CONSTRUCTION

Before getting started, read the instruction manual and the supplemental sheet. Kyosho's instructions are composed mostly of diagrams with notes to guide you. I referred to the supplemental sheet often for additional detail. The Spitfire comes with everything necessary to install fixed gear and plastic wheel wells are even provided, for those who prefer retracts. I installed Hobbico* retractable gear in my Spitfire, and I also changed the engine position from inverted to a side mount to use a concealed Slimline* Pitts-style muffler. I chose to use an O.S.* .46FX engine; this powerplant really makes the Spitfire move as a warbird should!

The first step is to hinge the ailerons using the supplied CA hinges. Each aileron is driven by its own servo, and you will need two 12-inch extensions. Then cut the hatches out of each wing panel. Use the small pinholes at each corner of the hatch as guides; cut the covering from pinhole to pinhole and remove the hatch. Then mount the servos to the hatches using the supplied hardwood blocks. Inside each servo bay, Kyosho thoughtfully threaded string through the wing panels to help you pull the servo leads through. Now, screw the hatches to the wing, and connect the ailerons to the servos using the supplied hardware. Kyosho uses a neat machined-aluminum clevis that is held in place on the pushrod by two setscrews. File a flat spot on the pushrods for the setscrews, as recommended in the instructions. A short 2mm screw attaches the clevis to the aileron

SPECIFICATIONS

Model: Spitfire ARF

Type: sport-scale warbird ARF

Manufacturer: Kyosho

Distributed by: Great Planes Model Distributors Co.

Wingspan: 56.7 in.

Wing area: 552 sq. in.

Weight: 5 lb., 11 oz.

Radio req'd: 4-channel with 5 servos (fixed gear), or 5-channel with 6 servos (retracting gear)

Engine req'd: .40 to .46 2-stroke or .50 to .56 4-stroke

Engine used: O.S. .46FX

List price: $189

Features: all-wood fuselage, tail feathers and scale-like wings with detailed markings; fuel tank; fixed main gear; wheels; fiberglass cowl; clear canopy; engine mounts; pushrods and clevises; hardware; illustrated instruction manual.

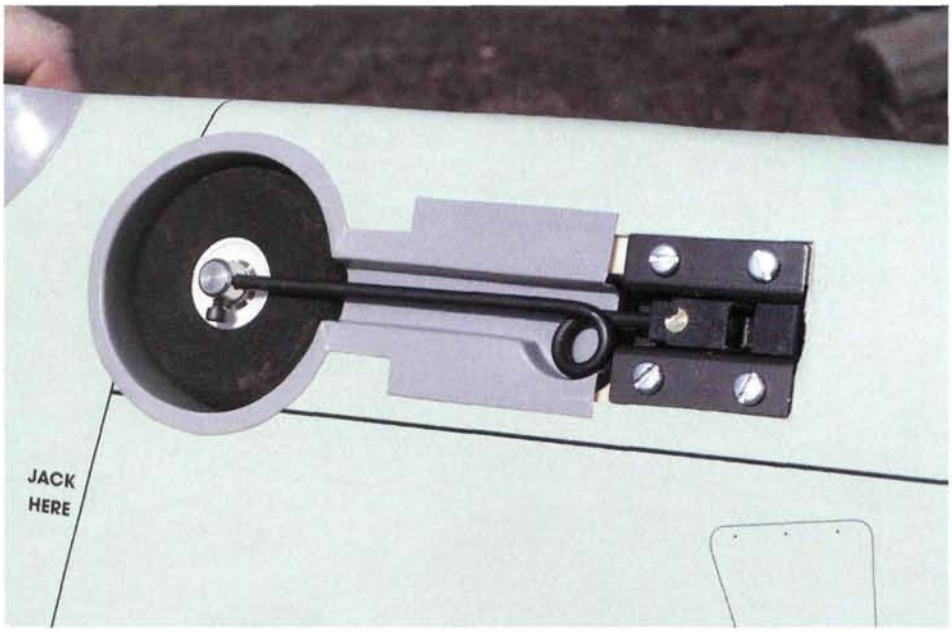
Comments: this easy-to-build ARF looks great on the ground or in the air. The Spitfire can be mission-ready in about a week of leisurely work, and it has excellent flight characteristics that are simple to master.

Hits

- Quick, easy assembly.
- Great-looking camouflage covering.
- Very nice scale-looking model.
- Fun to fly!

Misses

- Pushrod exits need to be cut out.
- Cowl and leading-edge wing fairing colors do not match the airframe.



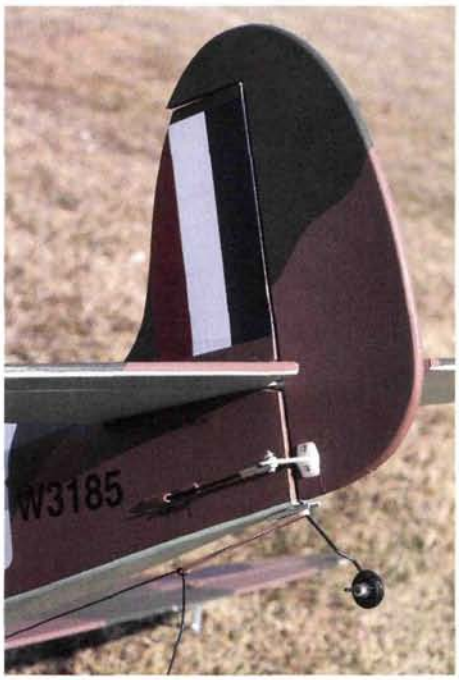
I used Hobbico retractable gear in place of the kit's fixed gear. Although the color of the wheel wells supplied in the kit did not quite match the airframe, the installation looks good and works flawlessly.

The machined-aluminum clevis is a nice design and is very sturdy. The preprinted graphics on the covering are remarkably detailed, especially for a sport-scale ARF.

horn. I thought that the screw was too short, so I used a longer 2mm screw and nut and used thread-lock to secure it.

I installed the retracts at this point, before I joined the wing panels. I first cut the covering around the slotted gear blocks (as I did the wing hatches) and removed them; they are not used for the retracts. If you use fixed gear, you must epoxy the blocks back into place. Using the measurements given in the manual, I cut out the wheel-well openings in the wing a little undersize. I then used the plastic wheel wells to custom-fit the openings. Then I mounted the retracts and made the pushrods, making sure that they cleared the wheel wells. I then glued them into place with thin CA. With everything working correctly, I epoxied the wing panels together with slow-cure Anchor Bond* epoxy, thus allowing plenty of time to align the panels. After the epoxy had cured, I made the opening for the retract servo and installed a low-profile retract servo using the supplied mounts. I attached the pushrods, made some minor tweaks, and the retracts worked well.

I chose a side mount for the O.S. .46FX instead of the inverted mount called for in the manual. Note the Pitts-style muffler that fits nicely under the cowl.



The vertical fin is built right into the fuselage—a real time-saver. The horizontal stabilizer is easy to attach and needed only a little adjustment.

Then it was time to mount the wing to the fuselage by first installing the wing hold-down blind nuts in the fuse. When I centered the wing on the fuse, the predrilled bolt holes in the wing lined up perfectly with the blind nuts. Epoxy the reinforcement plate on the wing after you've removed the covering from underneath, and glue the small plastic fairing to the front underside of the wing. The fairing is molded in a light gray plastic and does not match the underside color of the wing.

The servo bay is large enough to provide easy access and adjustment. I installed a second piece of plywood under the servo tray to give the mounting screws more bite.

With wing mounting completed, it was time for the engine to be mounted. Because I changed the engine installation from inverted to a side mount, I used a Great Planes* .40-size adjustable engine mount. The thrust markings on this engine mount made the task easier. I installed the engine and the fuel tank and routed the fuel lines using the dimensions given in the manual. Then I marked and cut out the necessary openings in the fiberglass cowl and mounted the cowl on the fuselage. I was slightly disappointed that the color of the cowl did not match the airframe, so I painted the cowl to match it.

Next, mount the horizontal stabilizer on the fuselage following the steps in the manual; the stabilizer lined up for me with very little adjustment needed. Next, cut exits in the fuse for the rudder and elevator pushrods. I was a little frustrated by the lack of hole-position markings on the fuselage, so I used the photos on the box as a reference. Be careful because the wood is very thick. Now hinge the rudder to the vertical stabilizer and install the tailwheel assembly. Assemble the pushrods and screw the elevator/rudder horns to each flying surface. Follow the same procedure as with the ailerons when mounting the clevises to the pushrods. Before I attached the servos, I added a second piece of plywood under the servo tray to give the mounting screws more bite. Next, install the servos in the fuselage and attach the pushrods. Trim the canopy, then paint and attach it to the fuselage with the screws provided. I added a suitable pilot figure from my parts bin.

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

I ran a few tanks of fuel through the O.S. .46FX to set the high- and low-end needles to avoid any surprises. Taxi tests revealed that the Spitfire has a slight tendency to nose over, so I needed plenty of up-elevator until flying speed was reached. The manual recommends that you shim the gear to place the wheels farther forward. Takeoffs from pavement should pose no problems. With the big O.S. .46 up front, the Spitfire accelerates quickly and is airborne in no time at ½ throttle. At full throttle and with the gear retracted, the Spitfire becomes a small dot in the sky in no time. As with any warbird, you should keep a small amount of power on and flare just before touchdown. But even deadstick, the Spitfire is very manageable and glides nicely.

• SLOW-FLIGHT PERFORMANCE

The Spitfire handles very well at slow speeds. With the throttle back and elevator up, the Spitfire drops a wing with no tendency to snap. Add a little power, and the Spitfire is flying again quickly. It has a nicely balanced feel at low speeds.

• HIGH SPEED/AEROBATICS

Every respectable fighter should be able to hustle at full throttle. With the O.S. .46FX, the Spitfire really delivers! High-speed passes are solid, and scale aerobatics are great fun. Rolls on the low rate were a little slow and required a little down-elevator through the inverted. High-rate rolls were much cleaner and needed very little elevator. I could make loops as big or as tight as I wanted without snapping on full-elevator pulls. Inverted flight is just as easy and needed only a little forward pressure on the stick to maintain level flight. High-speed, low-level passes down the runway into a victory roll are lots of fun.

SETUP AND FINAL DETAILS

This is where the supplemental instruction sheet becomes really important. Do *not* use the CG or control settings in the manual; use the recommendations in the supplemental sheet instead. Mount the servos, and install the receiver and battery pack. Then you'll be ready to balance your Spitfire. I used my Great Planes CG Machine; it makes balancing easy. The Spitfire balanced at the recommended $3^{13}/_{16}$ inches (97mm) from the leading edge of the wing. I always set up the control throws using the recommended low and high rates, and the manual advises not to exceed the elevator high rate. After you've run a few tanks of fuel through the engine, you're ready for the all-important first flight.

CONCLUSION

The Kyosho Super Quality Series Spitfire ARF is an easy-to-assemble warbird. It took me about a week of leisurely effort to get it ready for the field. The Spitfire looks great sitting on the tarmac and even better in the air, especially with the gear tucked away. Though some of the plastic parts could match the airframe covering more accurately, they do not detract from the overall quality of the finished product. Now, where are those Messerschmitts?

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✈

MODEL AIRPLANE NEWS
HOW TO

by Roger Post Jr.

Fly on a windy day

OK! You've waited all week for Saturday, slaving away at your job and diligently checking the weather forecasts. Friday night's weatherman promises sun. In preparation for Saturday's trip to the flying field, you re-check all the gear you've already triple-checked.

At the field, the windsock is almost parallel with the ground. Rats! The wind is blowing hard. You have two options: go home or learn to fly in wind—not easy! But read on.

When landing in a crosswind, angle the upwind wingtip downward to prevent it from being lifted and flipping the model over. You could also crab the model's nose into the wind to maintain a straight heading.

Basic tips for becoming a better pilot

YOUR MODEL

Extremely small, light models can't handle the wind, but with other planes, there are a few things to consider.

• **Control-surface throw.** Because the wind is strong and the air can be "bumpy," the plane can be flipped into unusual attitudes; you'll need to have extra control-surface throw to help the model right itself. This usually means going a little beyond the model's recommended high rate settings. If you have a computer radio, you might want to add exponential to the ailerons and elevator.

• **Reliable power source.** For electrics, this means a fully charged battery, and fuel-powered aircraft require a properly tuned engine. To prevent your engine from leaning out in the air, adjust it to produce just less than max rpm.

• **Structural integrity.** A small model will stand up to gusts, but if the wind/gust speed exceeds the model's structural integrity, the wing can fold. Leave small models at home on windy days; limit the small, stick-built models to 7 to 10mph winds. Forty-size trainers and larger models can usually withstand winds of 15mph plus.

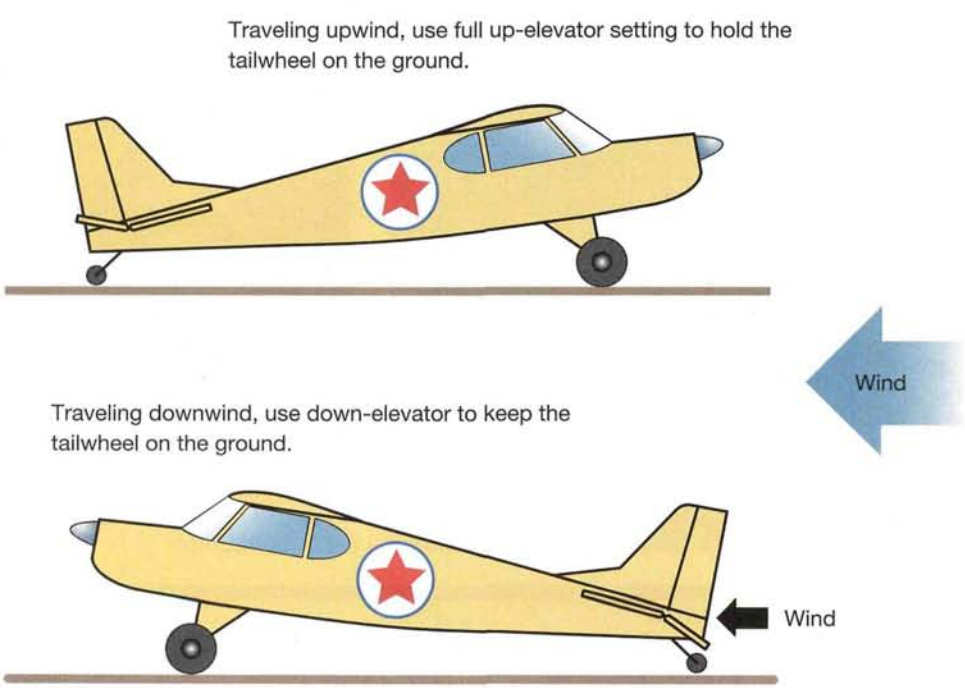
Ensure that all the model's components are firmly attached, and use plenty of rubber bands to hold the wing in place. On a high-wing model, push up on the wing's LE to ensure that it won't lift up during flight.

PILOT PROTECTION

Novices should limit themselves to 10mph winds because a stronger wind could make landing—especially in a crosswind—extremely interesting. As your skills advance, you'll be able to tackle higher wind speeds and greater crosswind angles.

If your flying site has sand, dirt, or dust and the wind is constant, wear goggles or wraparound sunglasses to protect your eyes and prevent them from watering; it's tough to fly when your eyes are tearing.

Figure 1. Taxiing a tail-dragger in wind



TAXIING

• **Smooth field.** If you fly a tail-dragger off a smooth surface, when you taxi directly downwind, use full down-elevator and neutral ailerons, and steer with the rudder and use throttle to move the model forward. Full down-elevator makes the wind push down on the top of the elevator and hold the tail down.

• **Rough field.** Going upwind or downwind with a tail-dragger, use full up-elevator to keep the tail "glued" to the ground and avoid having a prop strike when the model hits a bump and tries to nose over (Figure 1). To taxi into the wind, use full up-elevator and neutral ailerons. To taxi a tricycle-gear model downwind, hold down-elevator to avoid having the tail lifted. Going upwind, use neutral elevator setting to avoid putting excessive pressure on the nosewheel (Figure 2).

• **Aileron use.** When taxiing, beginners often overlook the ailerons, and this is one of the reasons a model flips over during its trek to the takeoff point. To taxi with a tail-dragger or a trike-gear aircraft in a crosswind, apply aileron into the wind; for example: if the wind strikes the

airplane from the left, use full left aileron, and do the opposite for a crosswind from the right. This will help to prevent the wind from picking up the upwind wing and flipping the model over (Figure 3).

If the wind strikes the plane from the left rear quarter, use full opposite (in this case, right) aileron, and do the opposite if it strikes the right rear quarter. The idea here is that the wind will push down on the downward-deflected aileron and prevent the wing from rising (Figure 4).

• **Takeoff.** With a properly set up airplane, the takeoff is actually the easy part. If the wind is blowing right down the runway, gradually apply the throttle and steer straight with the rudder. In a strong wind, you may find that the aircraft (especially a high-wing model) will lift off by itself before you reach full throttle and before you rotate with the elevator. If this happens, apply more throttle, keep the wings level with the ailerons, maintain heading with the rudder and pull slightly on the elevator. You can actually get the plane to rise vertically with a slight angle of attack (AoA) with very little forward motion. As you add elevator, the wing's angle of attack will increase, so you'll need to add more right rudder to compensate for P-factor (the prop force that tries to swing the nose to the left).

With a shoulder-wing or low-wing model (especially a heavy one), you'll usually get to full throttle before takeoff. At this point, slight up-elevator will be required to make the model rotate to a slightly more positive AoA and then take off. Use the ailerons and rudder as mentioned previously, and fly the model to a comfortable altitude before you make the first turn.

• **Crosswind takeoff.** As when taxiing, during a crosswind takeoff, you should apply aileron into the wind. How much aileron you input will depend on the wind's strength and its angle to the runway. With a strong crosswind (let's say from the left), start with a full deflection of left aileron and the elevator in neutral. The reason for this is that when the model is at its slowest speed—the start of the takeoff roll—the ailerons are not very effective because of a relative lack of airflow over the wing. Therefore, a fully deflected aileron will be more effective in preventing the wing from lifting.

In wind, your model might take off before you're ready. Lower the nose and apply full throttle to complete the takeoff. Reliable engine performance is always welcome!

Biplanes of all sizes are particularly susceptible to wind. Before you fly in wind, always consider wind speed, your model's characteristics and your skills.

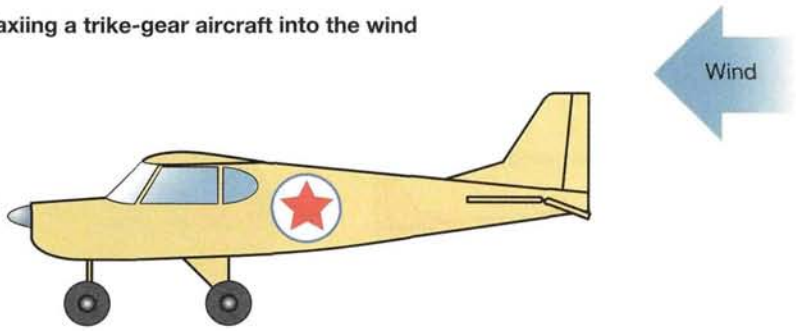
Whether the crosswind is from the left or the right, as you advance the throttle and the model gathers momentum, gradually decrease aileron input, steer with the rudder, and add a little up-elevator to take off. You want the plane to lift off with its upwind wingtip slightly lower to prevent it from being lifted and flipping the model.

At this point, you'll have some left aileron input, a little up-elevator input, right rudder input for directional control and anywhere from ⅔ to full throttle.

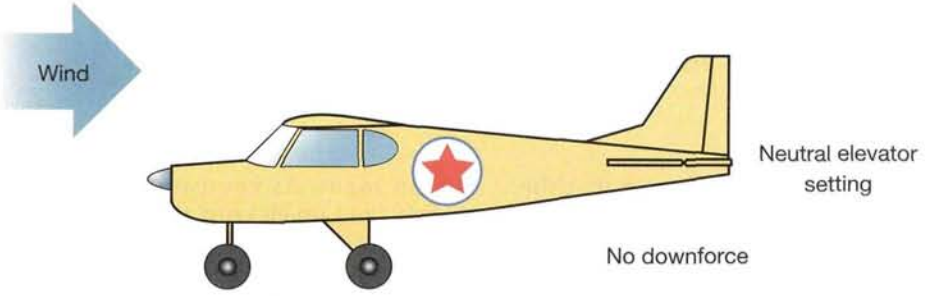
For the climb-out, hold the upwind wing down slightly or crab the model into the wind using a coordinated turn, and then climb to a comfortable altitude before turning.

• **The first turn.** This is where it can get exciting. With a headwind, if you turn the

Figure 2. Taxiing a trike-gear aircraft into the wind

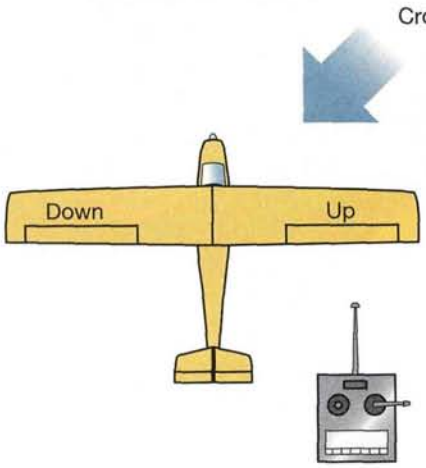


Traveling downwind with a trike-gear aircraft, hold down-elevator to hold the tail down.



Traveling upwind, hold neutral elevator to maintain constant pressure on the nose gear.

Figure 3. Taxiing *into* a crosswind



When taxiing into a quartering crosswind (left or right), move the aileron stick into the wind to raise the upwind aileron. This helps hold the wingtip down.

Figure 4. Taxiing *with* a crosswind

When the crosswind strikes the model's rear quarter (left or right), apply opposite aileron stick (left wind, right aileron stick) to lower the upwind aileron. The wind striking the top of the downward-deflected aileron holds that wingtip down.

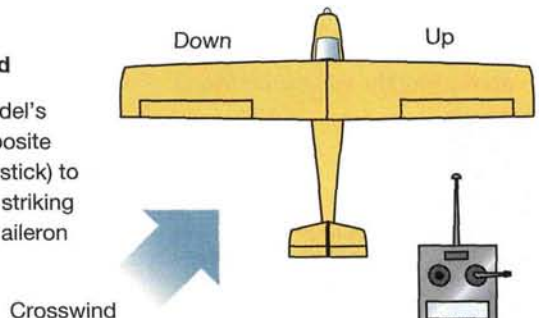
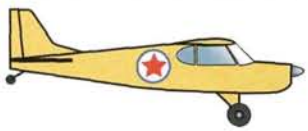
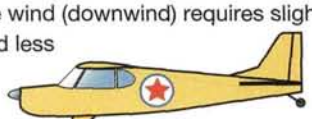


Figure 5. Headwind, crosswind and tailwind

Flying into the wind (upwind) requires slightly more power and some down-trim to avoid climbing.



Flying with the wind (downwind) requires slightly less power and less down-trim to avoid losing altitude and to reduce excessive ground speed.



To fly in a crosswind, lower the wingtip that points into the wind to prevent it from being lifted by the wind and rolling the model over.

model right or left, anticipate that the upwind wing might be pushed up vertically to an "over-banked" position. To counter this, make a coordinated turn (rudder and ailerons move simultaneously in the same direction) using only slight aileron input. As you bank the plane slightly, add up-elevator to compensate for the loss of lift, and return the rudder and ailerons to neutral. You may find that, to prevent the plane from flipping, you'll have to add a little aileron that's

When turning downwind, be ready to respond if the wind lifts the upwind wingtip too much. On really windy days, your model might even be rolled over to inverted. Don't panic; just complete the roll!

opposite to the direction of the turn. If it flips over, don't panic; just complete the roll and try the turn again.

When turning into a strong crosswind, your model might rise faster than you anticipated owing to the wind under its wings. To slow its ascent, reduce power slightly or use a little down-elevator. If you turn the model away from the crosswind, be ready to prevent the upwind wing from rising and flipping the model (see Figure 5).

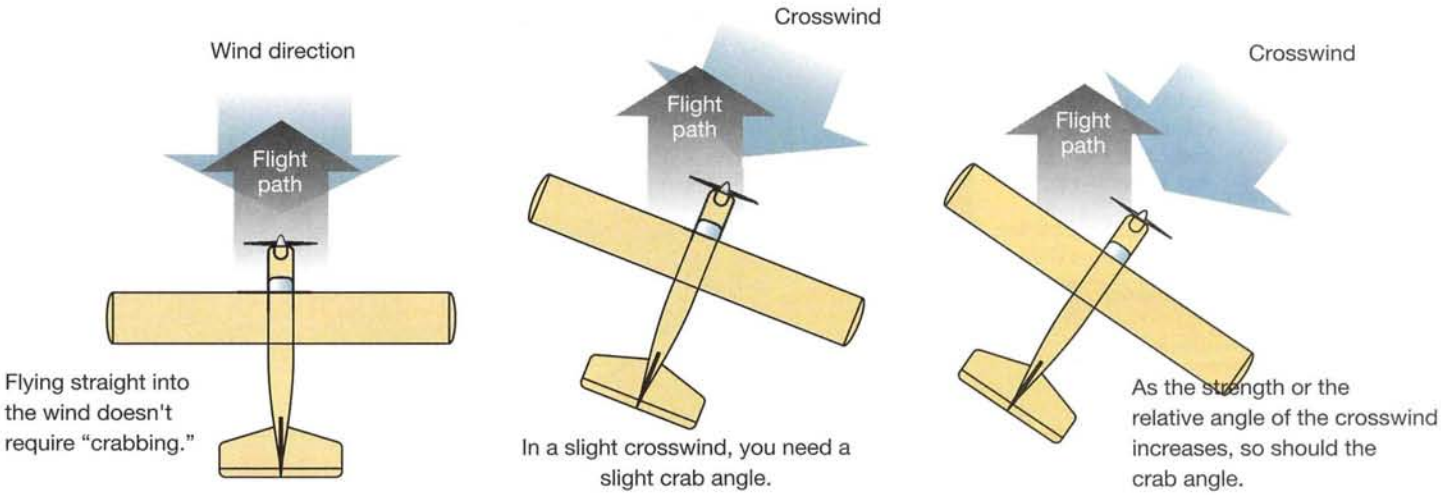
• **Heading downwind.** Once the model has completed its 180-degree turn and is traveling downwind, its ground speed will increase. For example, if the plane's airspeed is 40mph and the wind's speed is 15mph, the plane is going downwind at 55mph. You can slow it down slightly by reducing throttle and pitching the nose slightly up.

If there is a crosswind, it will hit the model from the rear quarter—left or right; turn the model slightly into the wind so that its ground track will remain parallel with the runway. Depending on the direction of the crosswind, this action will prevent the model from being blown off course.

AFTER TAKEOFF

For general flying, always keep your model upwind; maintain a safe altitude in case the engine quits. If your model is downwind and flying low, it will seldom make it back to the field if the engine conks out. When completing a maneuver downwind, try to end it within a safe gliding distance to the field in case you have a deadstick. If you're flying low, this would probably be within 50 feet of the runway; take your model's gliding ability and the wind speed into

Figure 6. Crab angle for flying in a crosswind



account. In a deadstick, push forward slightly on the elevator stick to help the model penetrate the strong headwind.

LANDING

Now the fun really begins! With a strong headwind, set up your landing by entering the downwind on a 45-degree angle and head toward the base leg turn. Lower the model's ground speed by reducing the throttle setting and adding up-trim. It's critical to make the downwind leg shorter than usual.

As you turn the model onto the base leg, the wind will push it farther downwind. Compensate for this by making the base-leg turn more than 90 degrees, and add power to help keep the model heading toward the runway. Try to crab the model into the wind as it flies the base leg (angle will depend on wind speed).

In wind, lightly loaded airplanes such as the ¼-scale Cub can be challenging to fly; when you learn to tackle the wind, you'll be a better pilot.

Turn the model to line up with the runway centerline, and use the throttle to control its rate of descent. Use the elevator to control airspeed and coordinated ailerons and rudder to keep the wings level. You'll constantly have to adjust the power, pitch and bank as you attempt to land the plane. That's how it is in wind; so don't freeze the transmitter sticks and hope that the model will land itself (it will, but not in one piece!).

On touchdown, chop the power to idle, hold in enough up-elevator to keep the wheels on the runway, and steer with rudder; the ailerons should remain neutral. When the rollout stops, turn off the runway and taxi back; remember to adjust the elevator and ailerons to cope with the wind.

• **Crosswind landings.** These two words seem to strike as much fear into the heart as "tax audit." For a crosswind landing, on the downwind leg, crab the model into the wind so that its ground track remains parallel to the runway, and keep the downwind leg shorter than usual.

If the wind is hitting the model from the front or rear quarter when you turn it onto the base leg, turn it more than 90 degrees and crab it into the wind. It will look as though it's flying crookedly along the base leg with its nose (pointed toward the runway) 10 to 30 degrees off the intended base-leg course. This is fine because it will prevent the model from drifting farther away (Figure 6).

As you turn the model onto final approach, you can:

- crab it into the wind, or
- side-slip it down the entire approach path.

The touchdown and roll-out technique for both is:

- chop the throttle to idle;
- control the direction with the rudder;
- gradually increase the aileron deflection into the wind;
- use the necessary elevator and aileron deflection to keep the wheels on the ground.

At the end of the rollout, the aileron should be fully deflected into the wind.

That about sums it up. I've seen too many frustrated modelers pack up and grumble that it's too windy to fly. Those calm days seem to be few and far between—at least where I live. I hope this information helps you to fly more regularly—not just when the wind allows. With a little practice, you'll enjoy the challenge of flying on windy days. Good luck.

On a windy day, make your landing approaches a little faster to maintain control (wheel landing). Don't slow too much, and when you do land, apply a touch of down-elevator to keep the wheels on the ground. And try to keep the aileron stick pointed into the wind.

by Jerry Small

Profile Gee Bee

Indoor pylon racing, Thompson-Trophy style!

As it gently touched down after its first flight, a nameless railbird shouted, "Jimmy Doolittle would have been proud!" No, it wasn't the 1932 National Air Races in Cleveland, OH; it was a local basketball gym, and the racer didn't have the 800hp that Gen. Doolittle enjoyed. It was the exciting beginning of what I think will become a wonderful national event. Perhaps it will even be called "Thompson Trophy Racing"!

A small group of fliers from the Dallas/Ft. Worth, TX, area have been building these indoor racers for more than a year now, and they have come up with a loose set of rules and limitations. Basically, the planes must:

- resemble Golden Age racers in profile;
- have approximately 200 square inches of wing area;
- carry no more than 6, 120mA battery cells;
- weigh 6½ to 8½ ounces (7½ ounces seems to be the average);
- must take off on their own.

If you're interested in this up-and-coming micro pylon racing, the plan that's presented here is a good place to start. It doesn't get any better than a Gee Bee! It's an incredibly simple design, and most people will be able to just use the plan. I'll keep this brief so you can get started.

The fuselage is built out of a slab of ½-inch-thick beaded-polystyrene foam with 1/32-inch-thick balsa on both sides. Prior to "skinning" both sides, determine the radio-gear placement, and cut out the appropriate areas.

Hold the servos, receiver, etc., in place with masking tape, and use 3M77 spray adhesive to "plank" both sides with the 1/32-inch balsa sheets (3M77 won't attack the foam; check all other adhesives). The proper way to use the 3M77 is to first lightly "mist" both the foam and the balsa. This stuff is heavy, so be gentle.

The tail surfaces are all 1/16-inch balsa and should be C-grain. Applying Japanese tissue isn't tricky: just mist both the tissue and balsa with 3M77 and apply the tissue, smoothing it down with your fingers. Do the bottoms (if applicable), and lap the top

surface around to the other side.

To cover the curves, just cut small slices with a sharp hobby knife. Seal the edges with thinned white glue using a small brush and wiping off the excess with a paper towel. When the glue is dry, gently dampen the surface with a wet paper towel and then allow it to dry. Then brush on one coat of thinned nitrate dope. We use this method to "tissue" all surfaces.

The wing couldn't be much simpler. You can cut the plan view first and then pin it over the ribs, or, if you prefer, position the ribs by hand and glue them into place one at a time. I've tried both methods, and they're both easy.

The ailerons are simple and self-explanatory. The cheap, light, aluminum welding rod that's used as a torque rod is unique, however. Pick some up at a welding supply store; they're extremely handy.

The landing gear is a little different in that a wire doesn't go down to the wheels. This seems to work well as long as you use the wire torsion-bar system.

SPECIFICATIONS

Model: Gee Bee

Type: indoor profile racer

Wingspan: 34.25 in.

Wing area: 180 sq. in.

Weight: approx. 7 oz.

Wing loading: 5.6 oz./sq. ft.

Length: 21 in.

Drive system: 1524 motor with a 4:1 gear ratio driving a 9-inch Wes-Technik carbon-fiber prop

Motor current: 2 amps

Radio req'd: 3-channel (motor, elevator and aileron/rudder)

Radio used: JR R610M receiver, JR SL110 servos (two), FMA ESC

Comments: designed by Jerry Small, this Gee Bee indoor profile pylon racer is constructed of foam and balsa and is very easy to build. This model is one of a group of Thompson Trophy planes that modelers in the Dallas/Ft. Worth area have been racing in gymnasiums.

GO FAST. TURN LEFT!

At the 2000 Southwestern Aeromodeling Conference (SAC), attendees were treated to Thompson Trophy-style indoor racing. SAC contest director Bob Wilder and his fellow club member Jerry Small have developed indoor RC pylon racing to a high degree.

They set up their course by placing two, 4-foot-high Styrofoam pylons about 75 feet apart—close enough not to need flagmen or pylon callers. Generally, four models fly, each rounding the course 10 times to complete a race. Ten laps usually take about 2 minutes, so the average speed is a sensible 15mph—slow yet challenging.

Because of the tightness of the flying area, racers occasionally collide or hit a pylon or a wall, but because of the planes' light wing loadings and slow speeds, there's little significant damage, and there isn't any danger to spectators.

Their pylon racers were designed to look like the old Thompson and Reno Racers: 200-square-inch average wing area; 7-ounce average weight; power limited to 6 cells with a maximum capacity of 120mAh.

For the most part, the fliers use Sanyo* N-120TA cells in a 9V configuration with the usual snap connectors. Some use homemade 6-cell packs of N-110AA-type Sanyos. Both packs weigh 1.3 to 1.4 ounces, and at 2 amps of motor current, they will provide enough power for a 10-lap race.

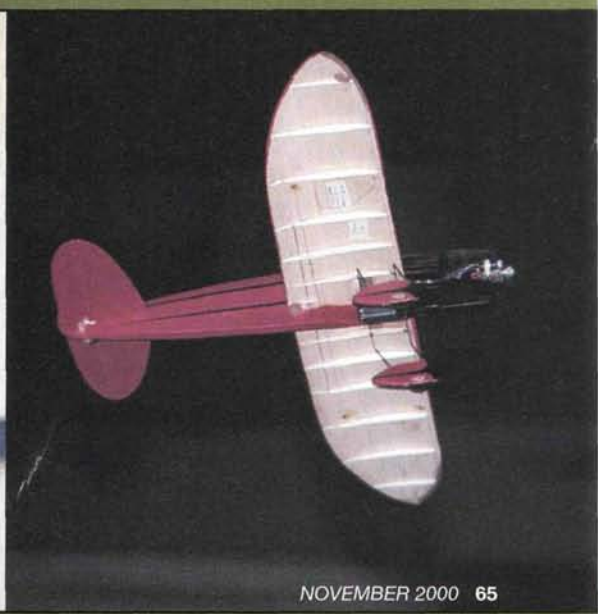
Most fliers chose the popular Mighty-Mo 1524 coreless motor with a homemade gearbox of 4:1 reduction and a 9-inch-diameter prop. Micro RC receivers such as the Hitec* Feather and JR* R-610M are popular, as are Hitec HS-50 microservos; the speed controls all have BEC. The new Castle Creations* 7A Pixie-7 controller seems to be the popular way to go.

All the racers are made entirely of balsa; their wings look like a Jedelsky section with the bottom left uncovered, and this allows easy repairs after the inevitable collisions.

As well as the Gee Bee, I saw the Brown B-2 Miss Los Angeles, a Whitman Buster, the Crosby CR-3, a Laird Super Solution bipe, a Gee Bee Model Z and a Schneider Trophy racer on floats (with wheel inserts). You have to see these racers perform to fully appreciate how truly enjoyable this kind of flying is. After every race, there was resounding spectator applause.

Bob Wilder wants to form a new group called the "National Indoor Remote-Control Aircraft Council" that will be registered with the AMA; its purpose would be to promote and coordinate all indoor RC flying, be it electric powered, CO_2, rubber or hand-launched and catapulted gliders. We hope that this organization will work with the AMA to organize a variety of indoor RC competitions and help with the regular booking of indoor facilities.

Pylon racing is only one element; we look forward to including aerobatics, scale, payload lifting, duration, combat, limbo and so on. If you share these interests, contact Bob Wilder, 1005 Hidden Oaks Ct., Colleyville, TX 76034 (Rjwmaw5@flash.net), and let him know that you would like to be a charter member. *—Bob Aberle*

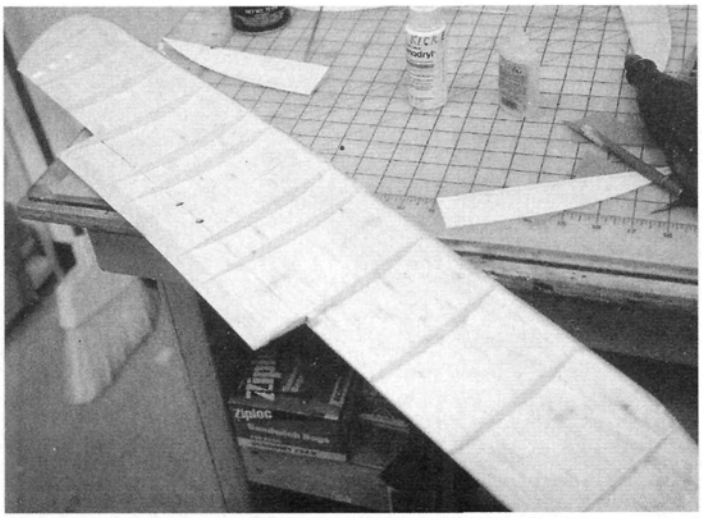


PROFILE GEE BEE

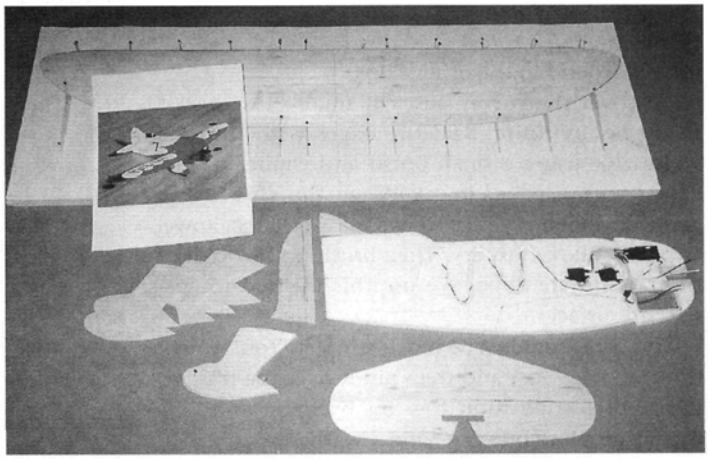
When you see the plan, I think you'll agree that this is easy. It really works and will take the toughest of landings.

The controls are also simple. You will need motor control, elevator control and coupled rudder and ailerons. To couple the aileron and rudder, use 0.045-inch-diameter piano wire to connect the servo arm back to the aileron. From there, use 0.007- to 0.010-inch-diameter piano wire or Kevlar-reinforced fishing line to go from the aileron horn back to the rudder. You can also use the fishing line on the elevator.

Finishing the Gee Bee would be easy if they made white tissue, but the white is really clear. You can either have a wood and red Gee Bee or spray white on first. Floquil paint seems to work best. It's light and has a lot of pigment—both pluses! You'll find it in model train hobby shops.



Simple sheet balsa wing with ribs supporting the underside.



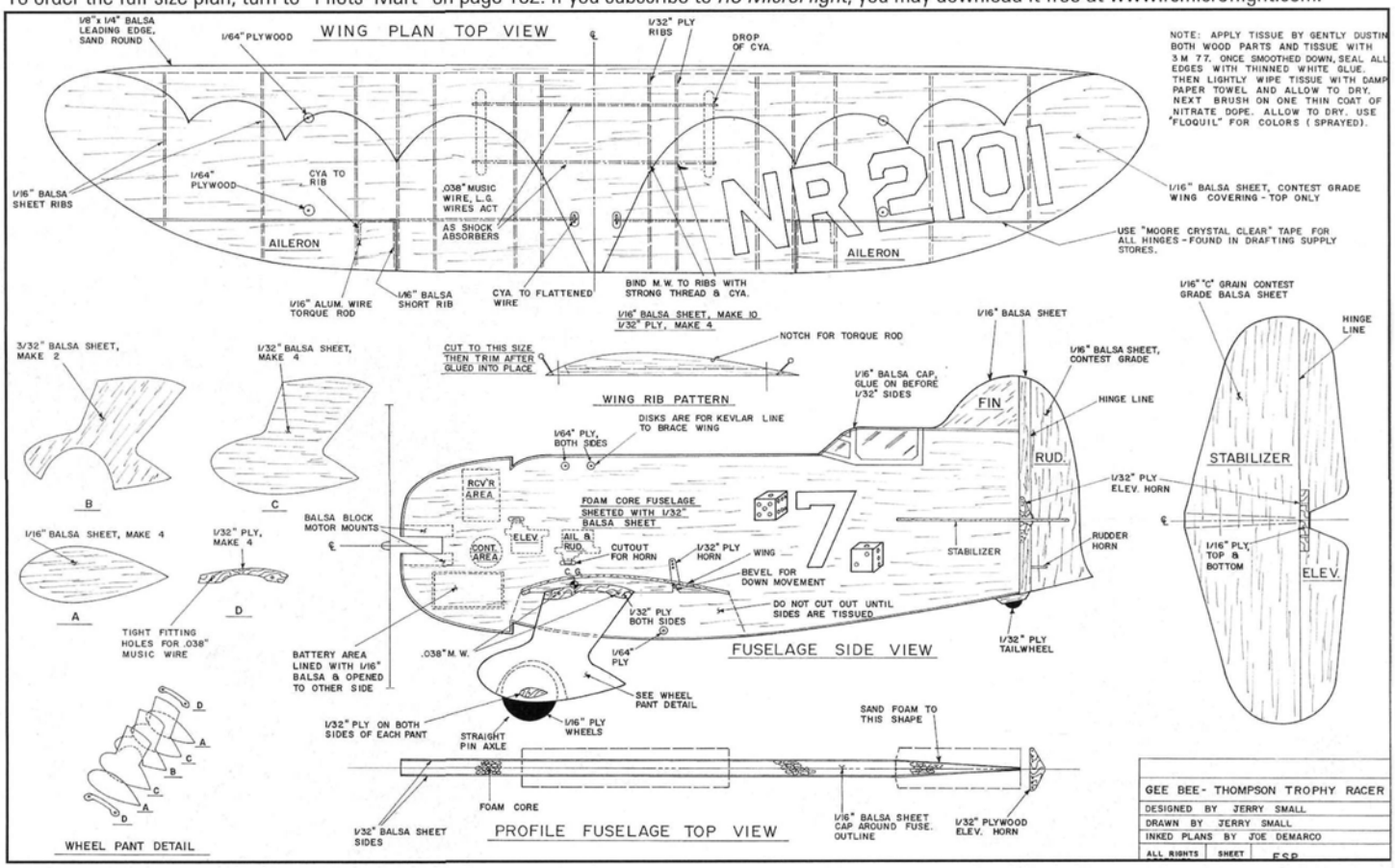
Sheeted-foam construction makes radio installation quick and easy.

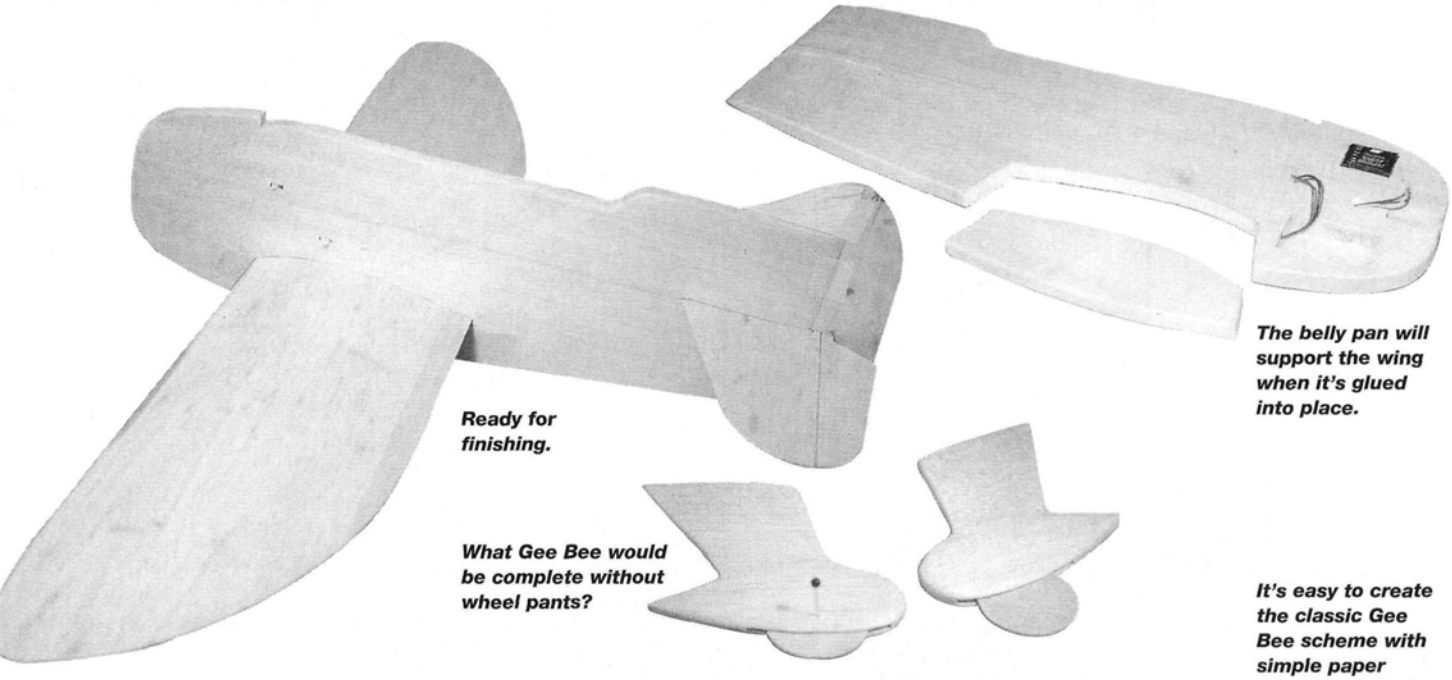
Before we can fly, we have choices to make: which motor and prop? As I write this, the best motor appears to be the Mighty-Mo 1524 with a 4:1 gear ratio driving a 9-inch WES-Technik carbon-fiber prop. I bought both of these from Todd Long Models*, and I understand David Lewis* also sells them.

The gearbox is a different matter. I made mine with gears I found in a toy store and some Delrin bearings made by Bob Wilder. You can also buy 4.2:1 gears from Cloud 9 RC* and Kenway Micro Flight*.

The best part: the Gee Bee flies well and has continued to get better as we make improvements and learn more about how to make a slow indoor model fly like a racer. A model such as this seems to need a lot of aileron throw and needs its coupled rudder to move very little; in fact, it may be best to have no left rudder at all and only a little right rudder.

To order the full-size plan, turn to "Pilots' Mart" on page 152. If you subscribe to *RC MicroFlight*, you may download it free at www.rcmicroflight.com.





Ready for finishing.

The belly pan will support the wing when it's glued into place.

What Gee Bee would be complete without wheel pants?

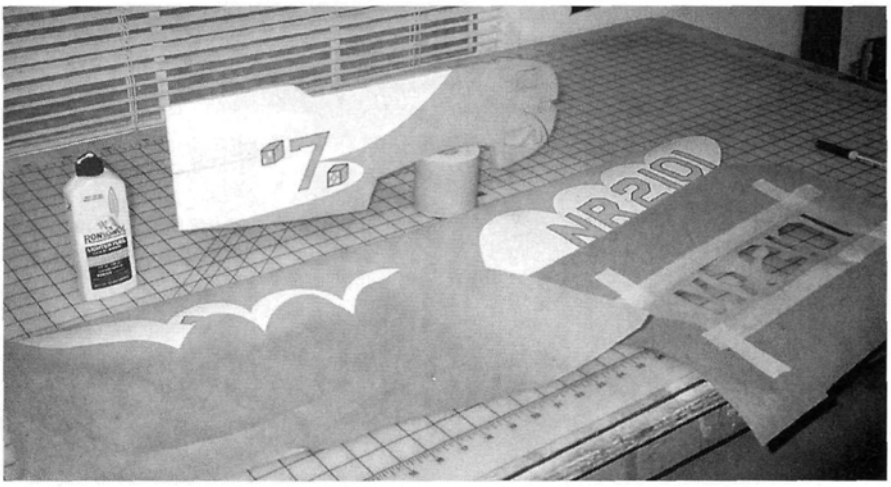
It's easy to create the classic Gee Bee scheme with simple paper masks.

If, when entering the left turn, you have equal left and right rudder, the nose begins to drop at the end of the turn as you continue to hold aileron, but you need right rudder to help "right" the model as it comes out of the turn. Let me know how this works for you.

Well, now you, too, can make Jimmy Doolittle proud and have a genuine Gee Bee. Build one or two and start to hold local races. We do this once a week; we race around two pylons—one at the top of the "key" at each end of a regulation basketball court.

It's too much fun to see three of these micro models dogging it out! Trust me; you'll love it!

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*



F3A Championships in Singapore

by Guy Revel

The Combined Asian-Oceanic Continental Championships (CAOCC) provides an opportunity for European and Asian F3A pilots to compete before they hit the world stage. With eight participating nations plus South Africa as an invited country, this year's event was certainly the best championship to date.

At this event, the new F3A competition rules—including semi-finals, Unknown schedules and the TBL (Tarassov-Bauer-Long) statistical scoring method—were used for the very first time. The new rules are a step toward a different and more interesting style of flying. The new F-01 schedule was used for the first time during the semi-finals and finals. This schedule is much more difficult than the P-01 used during the qualifications and helps to clearly differentiate the flying abilities of the top pilots.

Let me add that South Africa was an invited nation; a fine gesture, as there is no possibility in the foreseeable future of finding enough countries for an African Continental championship. The lone entrant from this country was Christopher Harris, a junior who is a fine pilot and who even designed his own airplane.

The five finalists, left to right: Hiroaki Nagahata, Steve Coram, Kouji Suzuki, Alfred Pye and Hiroki Koyano.

Left: Team Japan, kneeling left to right: Hiroki Koyano, Kouji Suzuki and Hiroaki Nagahata. Center: Team Australia, left to right: Alfred Pye, Chris White and David McFarland. In front is Alfred Pye's "Silhouette," which uses a 4-blade propeller and is the only non-Japanese model with an O.S. 1.40 F1 engine. Right: young Christopher Harris of South Africa uses his own design: "Tachiro," named after a South African bird of prey.

Those Faraway Places

by Rich Uravitch

I was privileged to be invited to this event as one of four Display Pilots from around the world, but I wasn't really sure what to expect when I arrived—14 air hours and 20,000 frequent-flier miles later—in Singapore. Like many modelers, I am usually exposed to modeling activities within the U.S. and Europe. Many of the products that we use in the hobby, however, come from the other side of the world; and more than a few of the widely known "standards," such as O.S. and Enya engines, Futaba radios and the EZ ARFs that started the current trend, originated in Asia. We now enjoy a broad range of imported products from lands such as China, Thailand, Korea and Hong Kong. With all of this neat stuff coming from Asia to the U.S., you can imagine the great RC products available on the Asian domestic market. Aeromodeling in Asia is flourishing!

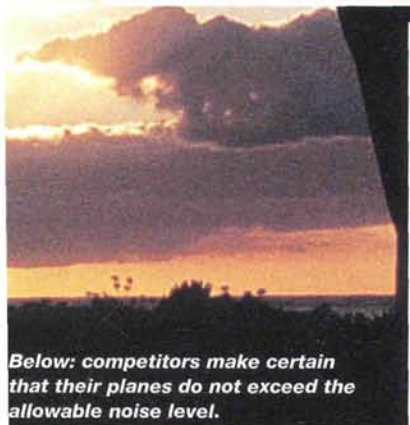
For those of you who need a geography refresher, Singapore is in southeast Asia, very close to the equator; it's southeast of Thailand and Cambodia, and northwest of Australia. It isn't a very large country, but it is a hub of banking and technology activity in that part of the world.

Modelers here seem to view their activity more as an avocation than a pastime. Supplies including kits, radios and modeling materials are exported from the region. My host, Mike Selby, provided the means and opportunity to visit some local hobby shops in our equivalent of a mini-mall. The three shops were next to each other and had very little overlap in product lines. These shops were jam-packed with goodies; I saw wall-to-wall kits, radios and accessories. It was quite impressive; obviously, there is a substantial market of modelers.

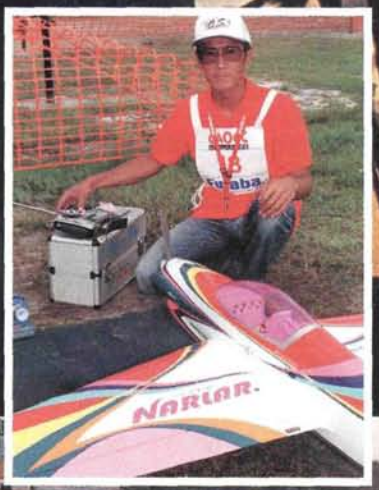
What Singapore may lack in size, it certainly makes up for in enthusiasm. There is one officially sanctioned field where virtually all RC events take place, and that is where the CAOC Championships were held. We have so many RC clubs and flying fields in the U.S. that it's hard to imagine that in Singapore, most modelers belong to the RMS (Radio Modelers Singapore), and this field is the only flying site. Also, it is generally only permissible to fly on weekends!

It's clear that modelers in the region are as enthusiastic about their activities as modelers in the U.S. The make-up of the group seems to parallel other locales, as well: the modelers are predominantly sport fliers, but their interest is growing in scale, jets and aerobatic models. I think we can count on seeing some great competitors emerge from this area of the world.

Above: Chaiphat Tubthong (Thailand) prepares his "Jasmine." Notice the composite landing gear legs, an increasingly popular feature. Below: elegant own-design: "Kodas," by Thai competitor Surasak Bumphenboon.



Below: competitors make certain that their planes do not exceed the allowable noise level.



Above: Hiroki Koyano proved to be up to World championship level.

A GREAT SUCCESS

The level of competition is directly dependent on the quantity and quality of competition in any given country. It's no secret that the number of competition modelers in small countries such as Thailand, Singapore and New Zealand is severely limited. Although Japan has only limited exchanges with modelers from other countries because of the large distances involved, there are many Japanese competition modelers, and their participation contributes to improving the overall skills level.

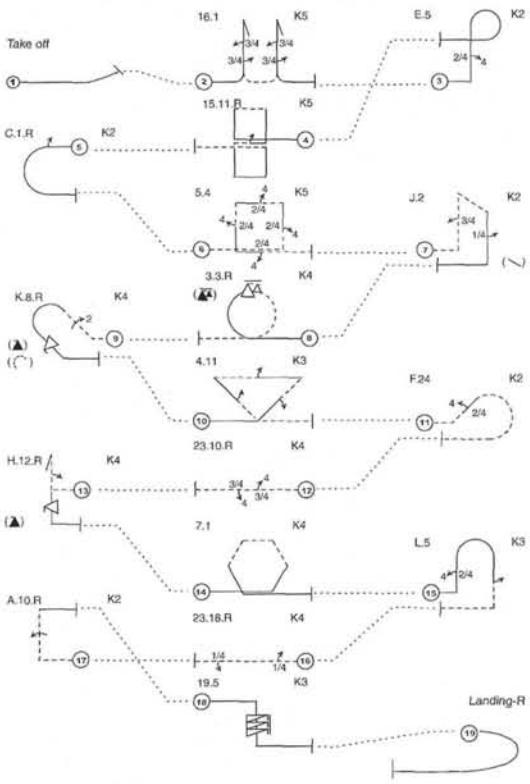
This year's championship was the result of much hard work by Singapore's best F3A pilot, Chan Tze-Law, who now heads that nation's leading club and is already involved in many FAI-related activities. With the support of Charlie Chua, the club's vice president and director of the competition, Chan Tze-Law made this first-ever Singapore-based international modelling competition a big success.

FINALS: A NEW GAME FOR ALL

The new rules brought many changes. Not only were the five finalists to fly two rounds each of F-01 and Unknown schedules (one different Unknown schedule for each round), but the finalists also started on an equal footing because no scores were carried over to the finals. Each pilot's best F-01 and Unknown scores were added to determine the overall winners.

To build the Unknowns, each of the finalists selected one maneuver from a list of 500 until the full 19-maneuver schedules had been built. Each pilot chose what he could do best and what he believed his opponents would have difficulties with. Of course, any practice-flying (model or simulator) was forbidden, and we immediately saw the small, hand-held models that are the usual training tools at these events. The two Unknown schedules featured maneuvers, such as a rolling circle and a rolling loop, that are completely foreign to traditional F3A schedules, but remember: these maneuvers were selected by the pilots themselves!

CAOCC Unknown schedule 1, Singapore, 6.24.2000



EQUIPMENT

Most airplanes have wide bodies, but this is by no means an absolute necessity. Top competitor Steve Coram still uses his "old-style" Maroc own-design model with little noticeable handicap—even for the Unknown schedules. A reduced weight is more important and will certainly be even more so with the F-03 schedule that will be introduced in two years. Constant-speed flying is taken care of nicely by the new generation of engines, along with large-diameter propellers that provide the pull necessary for long vertical climbing maneuvers and, at the same time, prevent a marked speed increase in the downward legs.

All three Japanese team members used the fuel-injection O.S. 1.40 2-stroke engine. This engine was clearly the equal of any other for power, torque and transition; also, for driving large propellers. I know many pilots who don't want to use 2-stroke engines because they feel the 4-stroke engine stays tuned better in varying weather conditions. I am not sure that this reasoning is valid when you use an electronic-regulated fuel-injection engine, but I heard that a 4-stroke, fuel-injection 1.40 O.S. engine should be ready for the world championship next year, thus satisfying competitors of all opinions.

A fully molded model was first flown at an F3A World Championship in 1987 by a Swiss competitor, then in 1991 by a German competitor, but the technology has not been seen outside of these countries until now. In Singapore, two of the Korean competitors had fully molded models—perhaps a sign that we may see more of such models in the future. After all, full-size CAPs and Extras also use fully molded wings, and one wonders why it should be different with our F3A planes.

ASIAN F3A FLYING ON AN UPWARD PATH

Singapore's organizers and competitors should be credited for an extremely well-run event and a superb competition. Events such as this provide the best opportunity for pilots from many smaller countries to quickly improve. The rapid growth of competitive flying in several Asian countries will undoubtedly boost the results of Asian-Oceanic countries at the world championships. For my part, I am fully satisfied that "Continental championships" will not be exclusively "European championships" anymore, and this will create more competition and contribute to the ever-increasing level of pilot skill.

SEMI-FINAL RESULTS

Pos.	Name	Nation	Prelim. normalized	Semi-finals 1	Semi-finals 2	Total (lowest score dropped)
1	Suzuki, Kouji	Japan	1000.00	991.08	1000.00	2000.00
2	Koyano, Hiroki	Japan	995.48	1000.00	967.88	1995.48
3	Pye, Alfred	Australia	955.60	986.87	972.19	1959.06
4	Coram, Steve	Australia	954.97	966.32	876.42	1921.29
5	Nagahata, Hiroaki	Japan	932.05	917.41	902.86	1849.46
6	Albert, Peter	Germany	959.57	799.90	829.29	1788.86
7	McFarlane, David	Australia	861.91	804.11	867.78	1729.69
8	White, Chris	Australia	862.80	798.71	826.56	1689.35
9	Kim Sung Nam	Korea	882.54	733.50	804.14	1686.68
10	Lau, Andy	Hong Kong	840.09	698.86	724.13	1564.22
11	Tan Yebin	China	862.26	0.00	0.00	862.26
12	Li Weiguo	China	837.92	0.00	0.00	837.92

FINAL RESULTS

Pos.	Name	Nation	Round 1 Unknown 1	F-01	Round 2 Unknown 2	F-01	Final score*
1	Suzuki, Kouji	Japan	1000.00	951.59	1000.00	1000.00	2000.00
2	Koyano, Hiroki	Japan	979.47	1000.00	958.03	958.14	1979.47
3	Pye, Alfred	Australia	999.12	966.72	962.03	963.67	1965.84
4	Coram, Steve	Australia	963.04	890.32	946.70	997.63	1960.67
5	Nagahata, Hiroaki	Japan	921.97	914.52	880.75	855.45	1836.45

*(sum of best Unknown and F-01)

A semi-scale, geared 280 electric classic

AERONCA CHAMP

SLOW FLYER

by Nick Ziroli Sr.

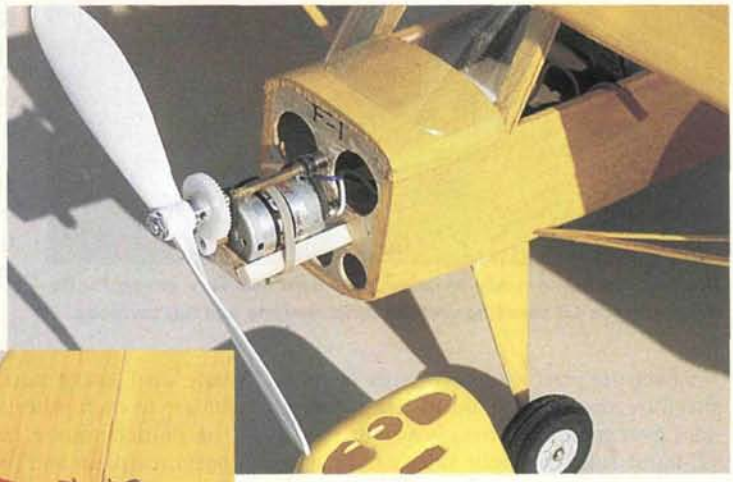
If you read any model magazines, you must be aware of the growing popularity of electric-powered RC models. Off-the-shelf, micro-size electric motors, servos and receivers have produced a whole new RC class—the park flyer or slow flyer. These new electronics make it possible for the average modeler to build RC models that are small and light enough to fly in confined areas; even indoors! Noise is not an issue.

The geared 280 electric motor is the smallest I have used, and it is what powers my Aeronca Champ—a Modelair-Tech* Titanic Airlines Gear Drive 280 with 3:1 reduction, to be exact. This is about as big as you can go and still be considered a park flyer. I have built a number of Speed 400 models, and these require a club field to operate in. The Champ can be easily flown in parking lots and small fields. A Hitec* Feather receiver, three Hitec HS-50 servos and an FMA* 5 ESC are used for control. I used my Airtronics* RD-6000 transmitter because one of its many features is the capability of coupling rudder to aileron control. Most high-wing models of this type require some rudder for good, coordinated turns. Another nice feature of the RD-6000 is its ability to operate with either positive or negative modulation-shift receivers. (Airtronics is positive shift, and Hitec receiver is negative.)

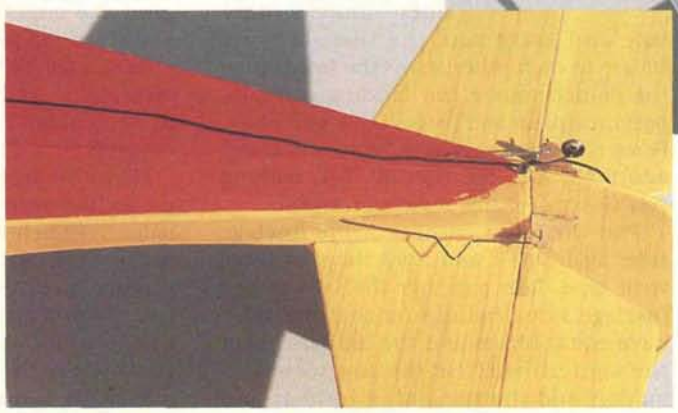
The Feather receiver has four channels and weighs just about ¼ ounce complete with case and crystal. It is narrowband but is only a single conversion; it is not as selective as the modern, dual-conversion receiver. The Feather was developed strictly for indoor and park flyers with an operating range suitable only for this purpose.

I chose the Aeronca Champ (produced from 1944 to 1948) because it has the basic appeal and appearance of a Piper Cub but is different; I personally think it is a better-looking airplane. You can also build a military version, as the Air Force purchased about 500 Champs and designated them as L-16s. I used Paul Matt drawings as a reference for my plans.

Giant-scale designer and builder Nick Ziroli loves his little Aeronca Champ and his Airtronics radio combination.



The motor installation on the hardwood mounting beams. A cable tie holds the power system in place. The formed engine cowl and windshield are available from Nick.



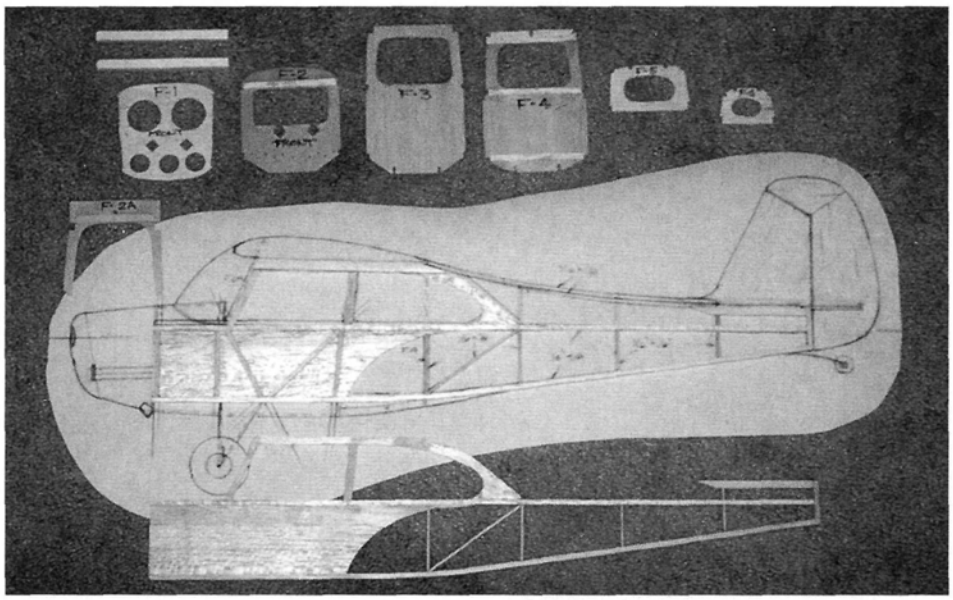
The elevator and rudder pushrods are made of 1/32-inch music wire. The jog bent into the wire is used to adjust the length.

CONSTRUCTION

It has been many years since I've built a small "stick" model, so building the Champ was a step into the past. I must say it was very enjoyable. It brought back memories of the many wonderful hours I spent as a young boy building every Comet, Cleveland, Megow, Joe Ott and other kit I could get my hands on. An important thing to consider with these small models is their finished weight. My Champ's flying weight is just under 11 ounces. I am sure a more careful selection of wood and omission of the ailerons would reduce the weight by at least 1 ounce. This doesn't sound like much, especially if you have been building 30- to 40-pound models for many years. But, with models this small, it does make a difference; every effort should be made to build the model as light as possible.

The tail surfaces could also be made lighter by using built-up construction; I had some beautiful, light, 3/32-inch balsa sheet, so I used easier-to-build solid-sheet surfaces. All balsa (sticks and sheeting) should be quarter-grain (with a speckled appearance) except for the LE sheeting and the fuselage top and bottom nose sheeting; use A-grain (easily bendable) there. To ensure the same density of all matching longerons, stringers and spars, I prefer to cut all my sticks out of sheet balsa.

CA glues can create problems when you build a small, delicate model like this. It is so easy to glue the model to yourself. A product that helps reduce this problem is CA Release from Craft and Hobby Creations*. This non-greasy cream acts as a release agent; you rub it onto your fingers.



As with any model, construction starts with building the parts over the plan. Here, the right and left sides are shown before fuselage assembly. Note the sheeting at the forward portion of the fuselage; it is flush with the outside of each side.

The basic airframe ready to cover; very light and very strong for its size. Note the LE sheeting and the solid ailerons and tail surfaces.

Cover the plan with wax paper or polyethylene sheet, then build the fuselage sides over the plan. There is a right- and a left-hand side; the right side is built with FS-1 and FS-2 on the plan and the 1/16x1/8-inch framing over it. Use the extended lines on the plan to position the framing on FS-1. For the left side, the framing is placed on the plan and FS-1 sits on top of the framing. Block up FS-2 and the cabin frames 1/16 inch so they are flush with the outside. To help make both sides identical, I prefer to cut two upright or diagonal pieces at a time. When you have one piece that fits properly, cut a second one to exactly the same length and angle. The second side then builds faster and is identical to the first side. The one 1/16 x1/8-inch diagonal in the open area must be in place for the side to hold its shape (see plan.) To help form the lower longeron where it bends, dampen it with hot water.

Use 0.047-inch-diameter wire and bend the landing gear to shape, and bind the front gear strut to former F-2 with heavy thread. Be sure to glue the 1/16x1/8-inch cross-braces to the formers as shown. Glue F-2 and F-3 to one side but do not glue them to the window frames at this time. Note that due to the offset motor-mounting holes, there is a front and a rear side to F-1 and F-2. They must be exactly square to the sides. Add the other side and make sure the two sides are square to each other across the front. Glue the 1/8-inch-square rear landing-gear support crosspiece and braces LG-1 into place. Force the window frames against F-3, and add F-2A. Add the firewall, F-1, making sure the correct side is facing forward.

Pull the lower corners of the fuselage sides against F-1 and hold them in place with tape. Join together the tails of the fuselage sides, being sure that the sides have equal curves and the tail post is on the centerline. (Use the top view as a guide.) Add the remaining formers and crosspieces. Bind the rear landing-gear strut to the 1/8-inch crosspiece. Wrap the axle and rear strut with fine wire and solder. For binding wire, I use stranded hook-up wire. Coat the wrapped thread with glue.

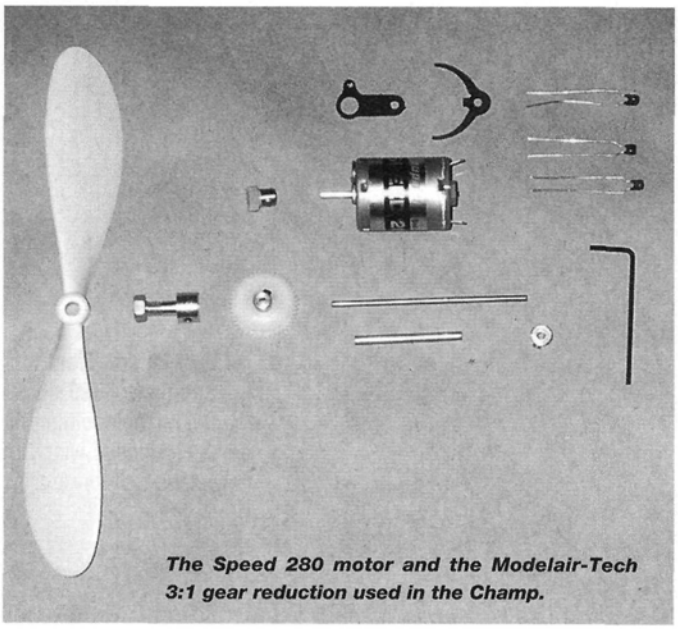
Glue the 1/4-inch-square hardwood motor mounts into place. These are positioned for the Modelair-Tech Titanic 280 3:1 gear drive, which I recommend. Shim the mounts if necessary to suit other motor/drive systems. Add F-4A and the 1/16x1 1/8-inch top stringers and the BS-1 bottom stringers. Cover the fuselage bottom with three pieces of 1/16-inch balsa and the top with one sheet.

The cowl can be built up from 1/2-inch balsa blocks and then hollowed out, or you can buy a vacuum-formed cowl and windshield from me if desired; mailing information is on the plan. The characteristic bubble windshield is a must-have if the model is to look like a proper Champ.

THE WING

Build the wing over the plan. If you don't want to include ailerons, do not cut the 3/32-inch notches or the pushrod holes in the ribs. Pin the 3/32x3/16-inch and the 1/8-inch-square spars to the plan, and make them in three pieces: the center section and two wing panels. Add the ribs and the trailing edges. Do not glue W-1 into place. Lift the trailing edge off the plan and place the 1/32-, 1/16-, 3/32- and 1/8-inch shims under it as shown on the plan. Add the 1/8-inch-square leading edge. Assemble the wingtips and glue them into place along with the top spars. Bevel the tips of the top spars so the wingtip is flush with the top of the spars. Add the 1/64-inch plywood strut attachment mounting pads to the bottom of the wing as shown on the plan. Recess them so they sit flush with the bottom. Join the wing panels to the center section while making sure to have the correct dihedral. If ailerons are included, use 1/2 inch of dihedral under each tip; with no ailerons, use 1 1/2 inches under each tip. After you set the dihedral angle, glue W-1 and the dihedral braces into place. Fill in between the center-section spars with 1/8-inch balsa. Sand the leading and trailing edges to match the rib contour, and cover them with 1/32-inch balsa. Handy tools to sand the edges with are sanding sticks available from See Temp*. Available in four grits (about 220 to 100), these are 3/4x7-inch plastic strips with sandpaper attached to each side. They work well on small models where a light touch is required.

Fill in the front of the spars in the center section with 3/16-inch balsa. Bevel the balsa to fit behind F-2A. Hold the wing in place and, with an 1/8-inch bit, drill through the hole in F-2A into the wing. Glue an 1/8-inch dowel (1/2 inch long) into the hole, allowing about 3/16 inch to protrude. Glue the small, 1/16-inch ply doubler to the bottom of wing mount WM-1. Drill a 5/64-inch (no. 47) hole through the wing as shown on the plan. Put the wing in place and square it to the fuselage. Drill through the wing and WM-1 with the same bit, then remove the wing. Thread the hole in WM-1 with a 4-40 tap and apply a drop of thin Zap to the tapped hole to harden the threads. Don't



The Speed 280 motor and the Modelair-Tech 3:1 gear reduction used in the Champ.

MATERIALS NEEDED

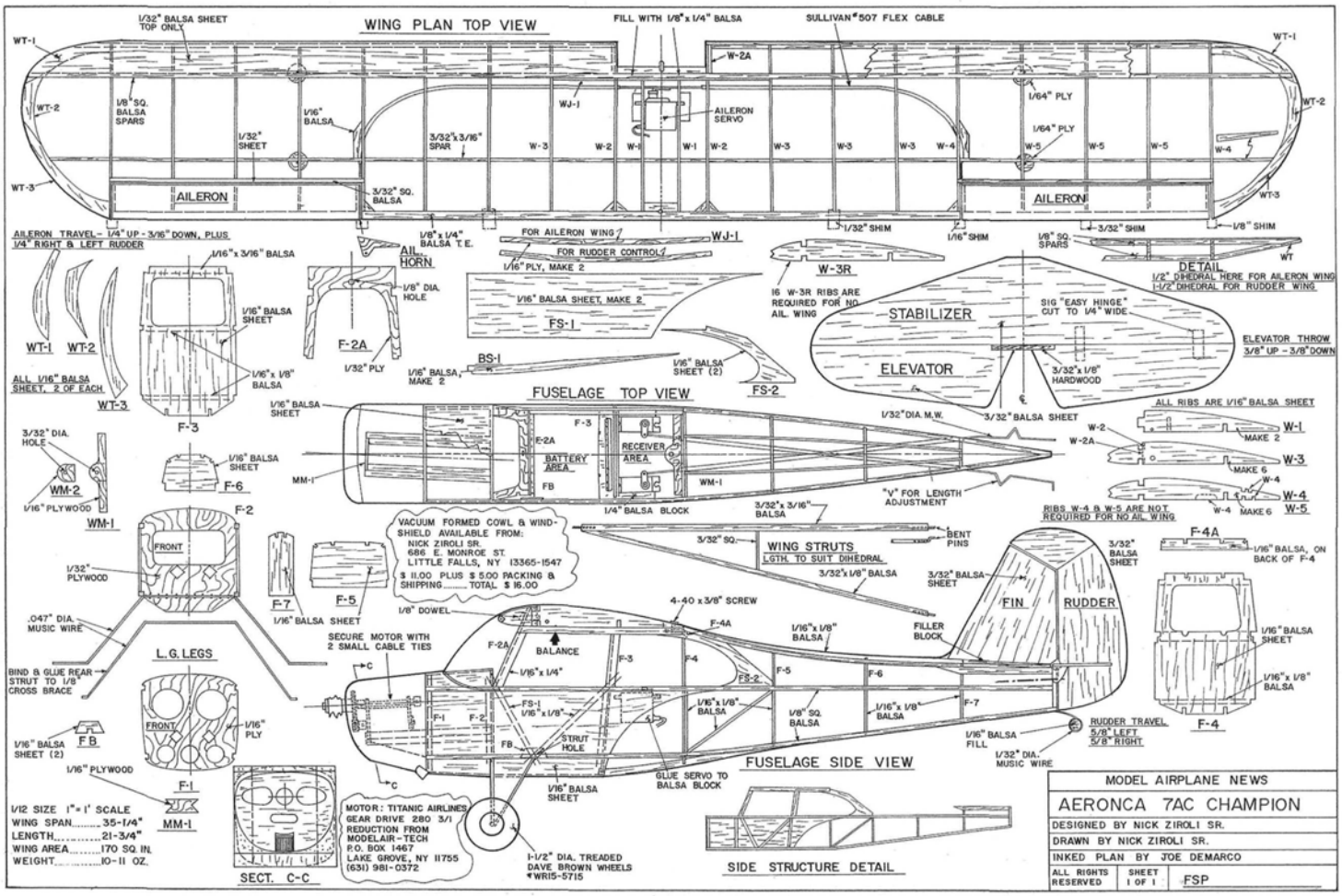
Product	Dimensions (in.)	Purpose/description
Balsa	1/8x3x36	Stringers, spars, LE, TE
Balsa	3/32x3x36	Stabilizer, rudder, spars
Balsa	1/16x3x36	Fuselage formers, ribs, tips
Balsa	1/32x3x36	Wing leading edge, ailerons
Balsa	1/2x3x12	Nose block
Plywood	1/16x6x12	Firewall, wing joiner
Plywood	1/32x6x12	Formers, control horns
Hardwood	1/4x1/4	Motor mounts
Wire	0.047 diameter	Landing gear
Wire	1/32 diameter	Pushrods
Sullivan cable	No. 507 (1 set)	Aileron pushrods
Litespan or similar	2 sheets	Covering

let the CA fill the hole. When it has completely cured (give it some time), re-tap the hole. Enlarge the hole in the wing to 1/8 inch and use a 3/8-inch-long 4-40 screw to secure the wing to the fuselage.

Assemble the wing struts over the plan. They are attached to the wings with straight pins that have had the heads removed and Z-bends formed in their ends. Glue the pins into the end of the struts. The Z-bends go into holes drilled in the plates on the bottom of the wing. The fuselage end pin is left straight and inserted into a hole in the side of the fuselage.

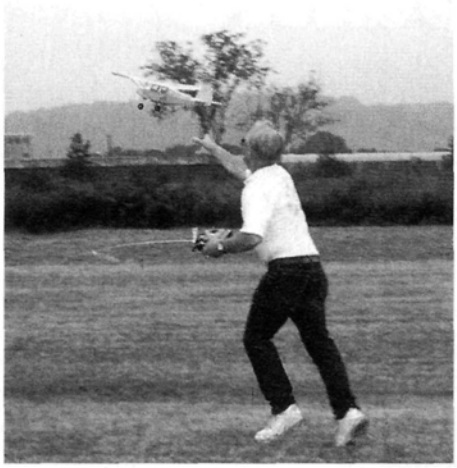
If ailerons are being included, cut away the trailing edge and ribs in the aileron area. Cap the rear of the wing between the 3/32-inch square spars with 1/32-inch balsa. I carved my ailerons from very light 3/8-inch balsa. They can be built up from 1/32-inch balsa or cut from the wing,

A semi-scale electric slow flyer, Nick Ziroli's Aeronca Champ has much nostalgic appeal. Using stick-and-tissue construction, the Champ has 4-channel control and excellent performance. It can be built with or without ailerons. A formed plastic engine cowl and windshield are available from Nick; ordering information appears on the plan sheet. WS—35 in.; L—21 in.; power—280 geared electric; radio req'd—4-channel; 1 sheet; LD 2. $14.95



FSP1100A AERONCA CHAMP SLOW FLYER

TO ORDER THE FULL-SIZE PLAN, SEE PAGE 153.



It's easy to hand-launch the Champ.

Nick buzzes himself with the miniature Champ. The small model has excellent flight characteristics.

SPECIFICATIONS

Model: Aeronca Champ

Type: semi-scale electric

Scale: 1/12

Wingspan: 35 in.

Length: 21 in.

Wing area: 170 sq. in.

Weight: 11 oz.

Wing loading: 9 oz./sq. ft.

Power train: 3:1 gear drive, Modelair-Tech Titanic Airlines 280

Prop: 6.9x6.3

Battery: 7, 270mAh Ni-Cds

Radio req'd: 4-channel (aileron, rudder, elevator, throttle)

Radio used: Airtronics RD-6000 TX, Hitec Feather RX, three Hitec HS-50 servos, FMA-5 ESC

Construction: built-up balsa and plywood covered with Litespan

Comments: a semi-scale electric slow flyer, Nick Ziroli's Aeronca Champ has much nostalgic appeal. Using stick and tissue construction, the Champ has 4-channel control and excellent performance. Can be built with or without ailerons. A formed plastic engine cowl and windshield are available from Nick; the ordering information appears on the plan sheet.

capped on the front and covered with tissue like the rest of the wing. For the aileron pushrods, I used Sullivan* no. 507 flexible cable. Run these through the holes as shown on the plan and glue the cable tube to each rib. The aileron servo fits into slots in the ribs and is secured with a little Pacer* Canopy Glue. To reduce weight, I did not use any pushrod adjustments (clevises) on my model. To connect the pushrod to the servo arm, I soldered a bent piece of 1/32-inch wire to the flexible cable. After I covered the wing and hinged and locked the ailerons in the neutral position, I soldered a similar 1/32-inch wire keeper to the cable.

The model's balance point came out perfectly with solid tail surfaces; it doesn't pay to build them from lightweight sticks and then have to add weight to the tail to balance the model. Join the sheet balsa elevators with 3/32 x 1/8-inch hardwood. Cover all the tail surfaces before you hinge them and mount them on the fuselage. Add the 1/32-inch plywood control horns after covering.

Install the servos and pushrod tubes in the fuselage. I use the inner yellow pushrod from Sullivan Gold-N-Rods as guide tubes for a 1/32-inch wire pushrods. Using canopy glue, attach the servos to a piece of 1/4-inch balsa, and then glue the balsa to the inside of the fuselage. This is easier to do before the fuselage is covered.

COVERING

I wasn't sure what to use to cover the Champ. Plastic film is easy to apply but heavy for a small model. My brother gave me a package of yellow polyester tissue called "Litespan," available from Hobby Lobby*. I must say I was very pleased with the results. There is no adhesive on the covering, so I used Coverite's* Balsarite to attach it to the framework. I applied a coat around the model's edges, then I used an iron to stick the covering down. Any covering overlaps must be recoated with Balsarite. I used and like the Coverite 21st Century iron. It has a good shape and very accurate temperature control.

I covered the fuselage with four pieces (top, bottom and sides). Be sure to coat the top stringers with Balsarite; otherwise, the covering will lift off them when it tightens. The finished model looks as though it is covered with yellow Silkspan or tissue—just the look I wanted. The orange on the fuselage is Testors* Model Master Acryl International Orange plastic model paint. After I had masked off the area, one brushed coat covered it very well. No clear dope was applied over the Litespan. The wing numbers are 2-inch Major Decal* waterslide decals. They were easily applied and look great.

I used Dave Brown* 1½-inch Lite Flite wheels (part no. WR15-5715). These are nice light wheels that look good on the Champ. The axle hole is 1/8 inch in diameter, so you need to reduce it with a bushing. I used a piece of yellow inner Gold-N-Rod; I sanded it to make a tight push-fit in the hole and glued it into place with a drop of thin Zap*. A small washer soldered to the end of the axle retains the wheels.

The receiver sits between the servos and the 7-cell, 270mAh Ni-Cd pack that's just forward of F-3. I glued a block of foam into the fuselage to hold the battery in place. A couple of plastic tie wraps hold the motor on the mounts. Part MM-1 prevents the motor from moving forward. The balance was perfect with this equipment location, but using a lighter or heavier battery will not change flight trim, since it is so close to the balance point. Set control throws as shown on the plan.

I would like to say that the Champ flew right off the board, but that's not how it really happened. The first flight attempts were ROG, and the airplane proved to be a bit unstable in pitch and especially yaw. I had used scale tail surface outlines, and they simply did not have enough area to overcome the destabilizing effect of the larger than scale prop. I glued balsa strips around the edges of the surfaces to add about 15 percent more area. The next day's flight test proved very successful. I made new, larger tail surfaces and replaced the old ones. The oversize surfaces don't look out of place at all.

The only change I made was to reduce the rudder throw; it was easy to overcontrol it during the takeoff. Coupling the rudder to the ailerons results in great coordinated turns without any adverse yaw or separate rudder input.

The Champ is a good flying and very scale-looking model. It is fairly easy to build for a stick model, and modern radio equipment and electric-power systems are readily available. Give slow-flyer scale a try, and turn your backyard into a flying field.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*

Astro Flight News

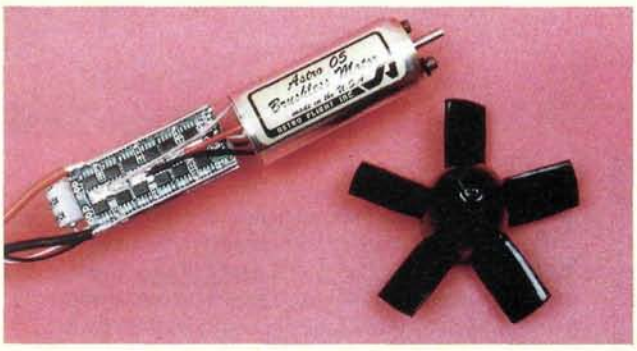
Astro Flight Inc. Introduces five new and exciting products for the electric flyer: The new Mighty Micro 010 Brushless Motor for park flyers, a new Ducted Fan Brushless 05 Motor for the Kyosho T-33, FAI-035 and FAI-05 Planetary Motors for Sailplanes and two new surface mount digital speed controls.

The Mighty Micro is here!

Our new Mighty Micro Brushless 010 Motor #801 has arrived. The motor is one inch in diameter and one inch long and weighs only 35 grams with sensorless control. It spins an APC 6x2.8 prop at 9800 RPM while drawing only 2.5 amps from a six cell 350 mahr Nicad pack. Now you can fly for 5 minutes on Nicads, 10 minutes on Hydrides and one hour on lithium cells. The tiny On-Off Brushless control has Brakes and BEC. This system will work with 5 to 8 cell batteries. Perfect for models up to 10 oz.

New Ducted Fan 05 Motor!

Our new 4 turn Brushless 05 Ducted Fan Motor #805F with 12 FET controller is specially designed to add Afterburner performance to the Kyosho T-33 and WE-Mo-Tek 480 ducted fan units. Run the T-33 fan on 8 or 9 Nicads or 10 Sanyo 3000 mahr Hydrides. The motor draws only 19 amps for 10 minute flights on Hydrides.

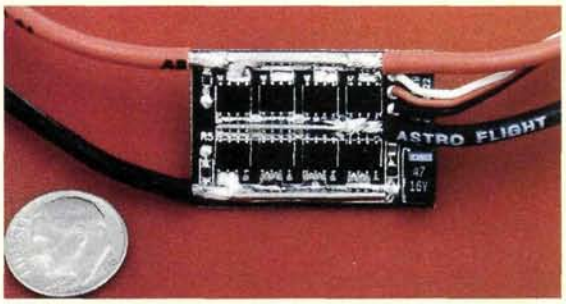


FAI-035 with Planetary Gearbox

Our new 4.4:1 planetary gear box is now available for all Astro Cobalt 035, 05 and 15 motors. The FAI-035 with planetary gear box is perfect for 7 cell competition sailplanes. The FAI-05 with planetary gear box, shown here, is perfect for 10 cell sailplanes.

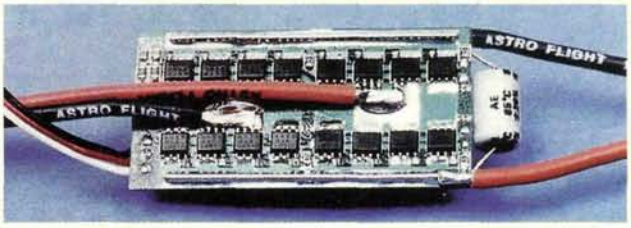
New Astro 215D Airplane Control

The new Astro 215D Speed control uses new surface mount technology for minimum size and maximum performance. The tiny 215D weighs only 8 grams and has Brakes and BEC. It handles up to 30 amps and 10 cells. Perfect for Astro Cobalt 035, 05 and 15 motors.



New 208D Reversing Control

The new 208D Reversing Control is designed for scale boats. It's 16 FET H-Bridge circuit gives you full power forward and reverse. The 208D weighs 1 oz and can handle 25 amps at 6 to 12 volts. It has a 2 amp BEC and a electronic current limit of 28 amps, so no fuses are needed. It was designed for tug boats and works great with 150 pound robots and electric powered blimps.

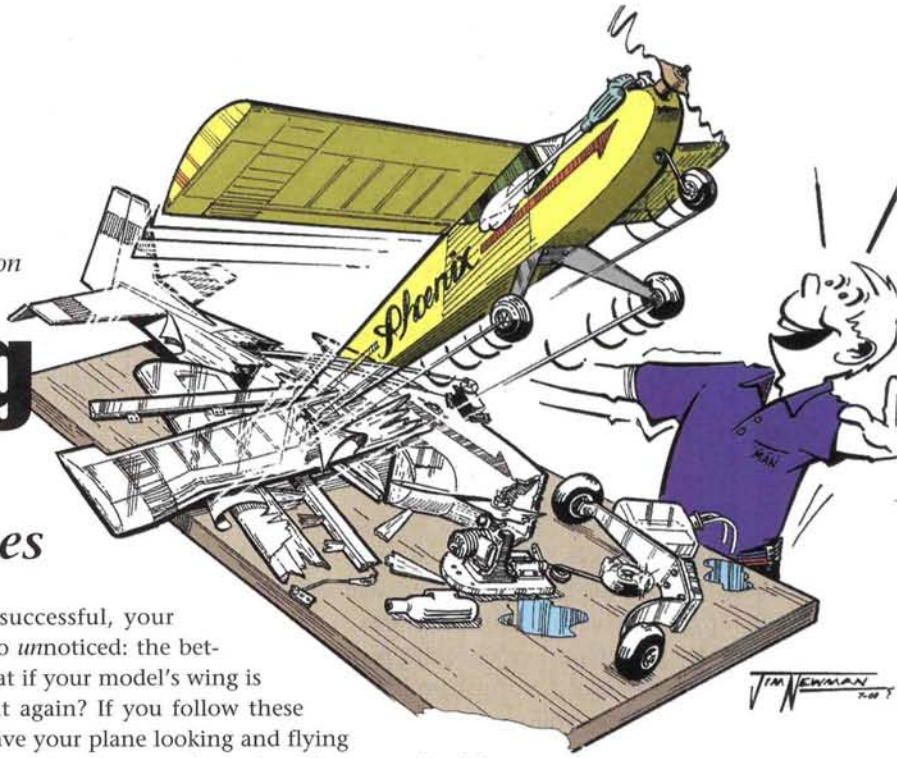


Astro Flight Inc. 13311 Beach Ave. Marina Del Rey, CA 90292
Phone (310) 821-6242 Fax (310) 822-6637 Web Site http://www.astroflight.com

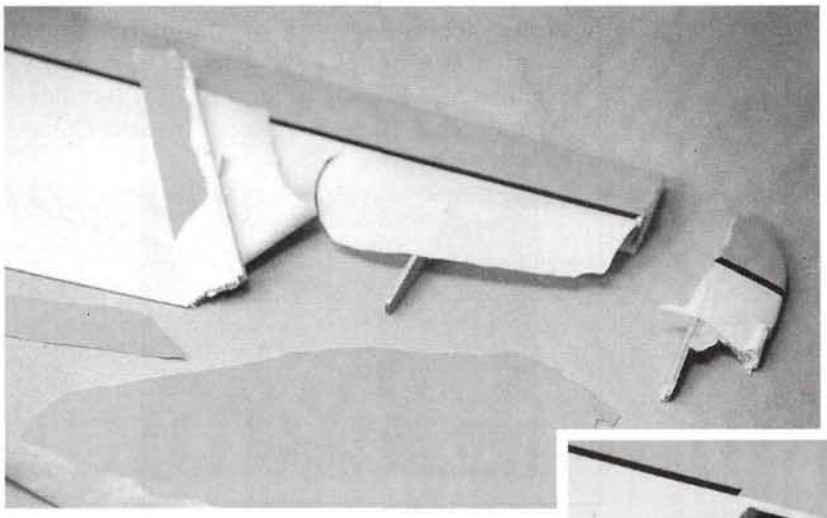
Repair your Wing

by Jim Simpson

Quick and easy rebuilding techniques

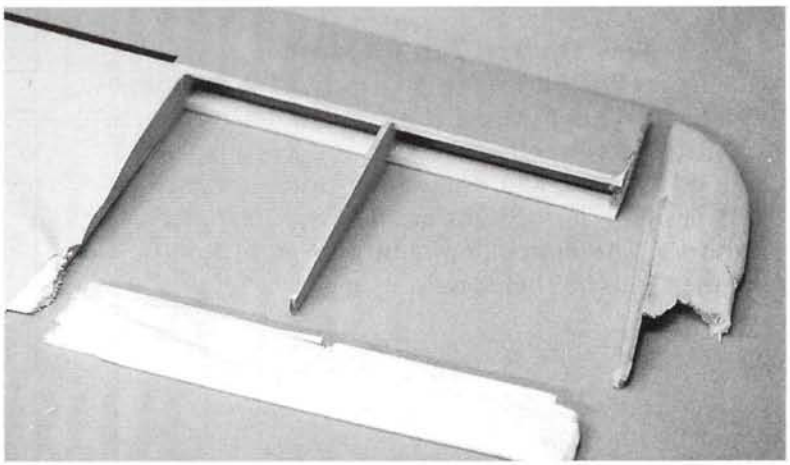


When making a repair, to be really successful, your goal should be to have your work go *un*noticed: the better you do, the less it shows. But what if your model's wing is broken? Can it ever be made to fly straight again? If you follow these tips, with minimal time and effort, you'll have your plane looking and flying like new. These simple steps show you which materials you will need and how you should use them. When you've finished, everyone *won't* see just how good your repairs are!



1 Retrieve all the parts from the crash site, regardless of their condition. This will save you time when you survey the damage, and it will help ensure a better repair. Lay out each piece and assess the damage. As a matter of practice borne of experience, I almost never repair a wing if the main spar is broken.

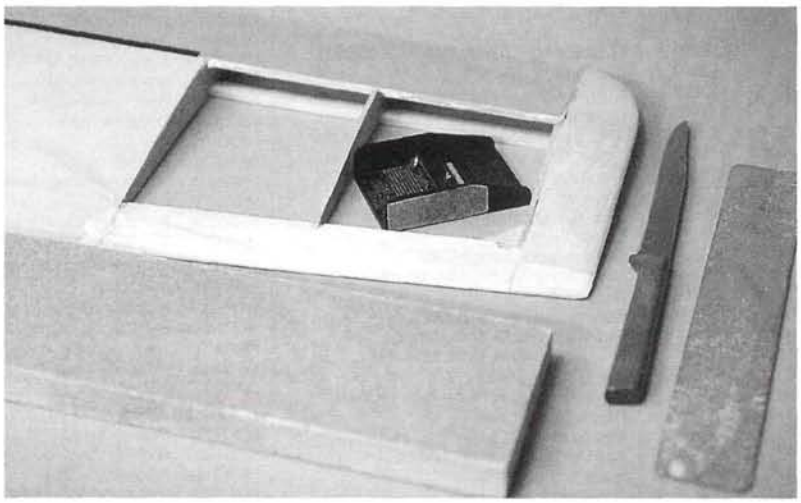
2 Remove the covering from all the damaged parts, and inspect the wing's structure. Note which parts are missing and plan to replace them at this time. Take special care to find any hairline cracks there might be along the wood grain. Repair these by applying thin CA to the crack and then squeezing the edges together. That will "kick" the glue; no need to apply accelerator. ▼



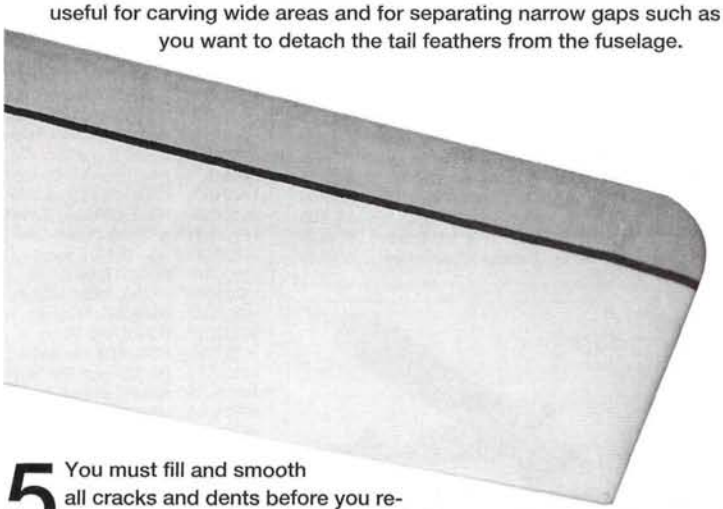
3 A cross-grain crack, such as that in the trailing edge shown in the photo, is best repaired with thin CA if it's a tightly fitting joint; if it isn't, use white glue or another slow-drying glue so you'll have time to work it in. Piece together non-functional parts such as the wingtip block with scraps, and fill gaps with balsa filler as shown. Use tape to secure the structure while the glues dries/sets.

Repairing dings and dents

Use tape as a mold for quick 'n' easy ding/dent repairs, especially for areas such as the wing leading edge. Instead of cutting out the damaged material and fitting in a block of balsa that would then have to be carved and sanded to shape, simply sand the damaged area to the original contour and apply masking tape, leaving a small opening through which you can apply epoxy. After you've filled the dent, tape over the opening and set the wing aside with the taped side facing downward so that gravity causes the glue to conform to the tape's contour. When the glue has set, simply peel off the tape and re-cover the wing.



4 After you've reassembled the main structure, carve and sand it to its original shape in preparation for final re-covering. A very thin-blade stainless-steel steak knife is an essential tool in any modeler's box. It is extremely useful for carving wide areas and for separating narrow gaps such as when you want to detach the tail feathers from the fuselage.

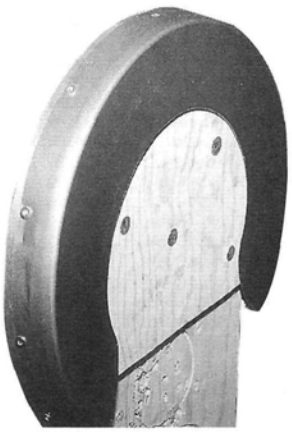


5 You must fill and smooth all cracks and dents before you re-cover the wing. If you don't, you will discover—too late—that imperfections show through the covering and often look bigger than they are. If you follow these instructions, however, your result should be like the one shown in the photo, and you will have to look hard to find where your repair begins and ends. ✈

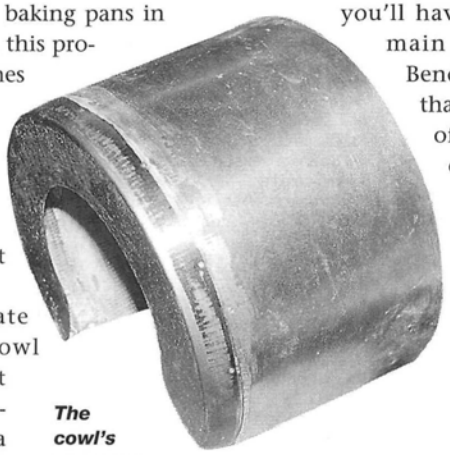
Custom-Make an Aluminum Engine Cowl

by Irv Furman

When building a ⅔-scale model of my full-scale homebuilt Fokker replica, I realized that I'd have to make nearly everything from scratch—including the cowl. Forming compound curves such as those needed on a cowl face in aluminum at first seems to be next to impossible without the use of expensive equipment. A perusal of local home/variety stores and supermarkets, however, yields ideal low-cost alternatives. You won't have any trouble finding a plethora of aluminum baking pans in the sizes you want. On this project, the cowl is 10 inches wide; for models that require a more pronounced cowl radius—such as Sopwiths—many stove burner liners will fit the bill.



The horseshoe-shaped cowl face. Note the bucking board that makes pop-riveting the aluminum strip much easier to do.



The cowl's main section should be fitted flush with the cowl face for a smooth final finish later on.

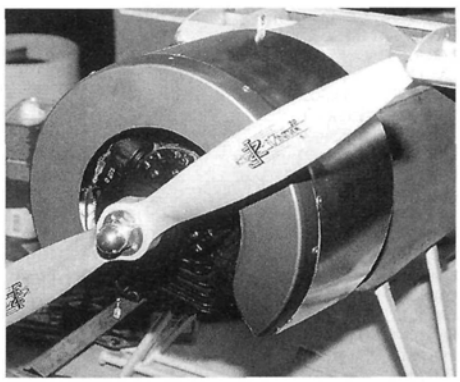
First, make accurate templates of your cowl using lightweight poster card or something similar. Using a scroll saw or a band saw with the appropriate metal-cutting blade, trim the baking pan's lip, leaving about ½ inch to attach the body of the cowl. Having trimmed the lip, cut out the pan's center section, following your template. (Note: if you cut out the center piece first, the pan will flex and wobble while you trim the edge, and that will make the job much more difficult.)

The main section of the cowl usually has a simple, horseshoe-shaped "U" curve. A sheet of 6061-T6 aluminum works best here; it will be springy even when bent, and that will lessen the chance of its kinking or being dented. You can find sheets in good working thickness of 0.015 and 0.020 inch in hardware and building-supply stores.

Now that you have the cowl face, you must join it to the main section. Pop-rivet a thin strip of aluminum around the inside diameter of the cowl face. Make sure the strip is wide enough to extend past the lip of the cowl face so that you'll have room to attach the main section of the cowl. Bend the aluminum sheet that forms the main piece of the cowl into an arc over the aluminum strip, keeping it flush against the edge of the cowl-face lip. Pop-rivet this into place. Do not worry about the rivets; you will drill these out later. The procedure will be easier if you make a "bucking board" out of scrap wood that's curved to fit the cowl's inside diameter, and mount it in your vise for drilling and riveting.

Now grind down the rivets on the inside of the cowl so that they are nearly flush with the aluminum but still grip it securely. Apply one or two layers of fiberglass tape around the inside of the seam. Use a high-quality epoxy resin, such as that by West System*, and allow it to cure. You can now drill out the rivets from the outside and fill the holes with epoxy or auto-body filler. Marson "platinum" polyester brush-on body filler is an outstanding product that makes smooth seams.

Fiberglass tape and epoxy secure the joined cowl face and main section, so the pop rivets can be drilled out.



The cowl is sturdy and light, and after it has been painted, it will look very true to scale.

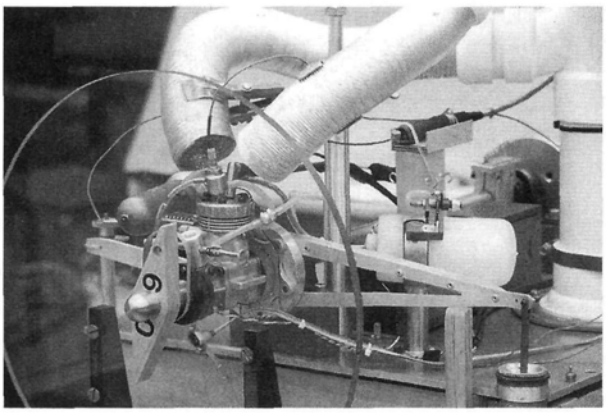
Be sure to test-fit your cowl carefully as you complete each step; make sure that the mounting holes, brackets and engine cutouts are accurate. To add a rolled edge, slit a length of automotive vacuum hose or wiper hose and push it over the aluminum's cut edges; CA works well to hold it in place. Wet-sand and smooth all the seams, finishing up with 320-grit paper. Now you are ready to prime, sand and paint.

I have used this technique to make several cowls; two are shown in the photos. The technique isn't difficult, the cost is minimal, and every cowl looks great.

**Addresses are listed in "Featured Manufacturers" on page 158.* ✈

Can a 2-stroke-cycle engine 4-cycle?

D. Cameron Brown of Chicago, IL, writes: "Dave, recently there has been some discussion on the Internet concerning 2-stroke-cycle engines and the term '4-cycling.' Some participants have indicated that 2-stroke engines can't 4-cycle, or fire every other revolution of the crankshaft. In your book, 'Two-Stroke Glow Engines for R/C Aircraft,' you described how these engines actually '4-stroke.' Have you changed your mind about this controversial issue?"



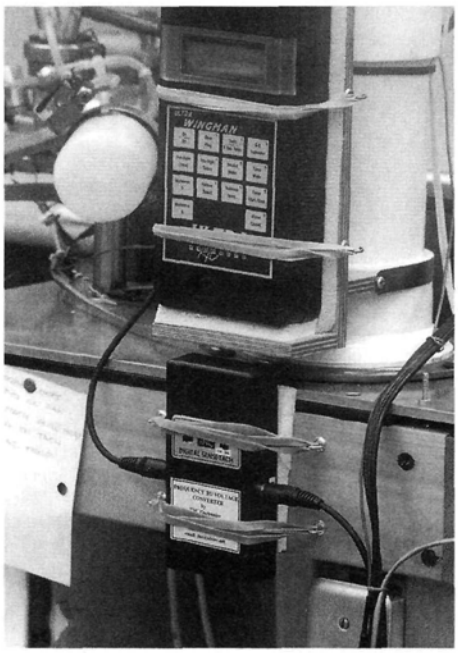
Basic components of a torque-reaction dynamometer: semi-rotation, ball-bearing-supported engine mount; air-blast deflection disc; forced-air cooling; oil-filled vibration damper; load beam (propeller substitute); and rpm sensor. At the rear of the unit are a pendulum weight attached to the engine-mount shaft and a torque-recording instrument.

Cameron, because some readers may not be familiar with the 4-cycling issue, I'll repeat what I said about 4-cycling in a 2-stroke-cycle engine: "If an engine's fuel is richened to just inside the rich limit of the combustion range, it will begin to misfire every other cycle. Why? As the combustion process takes place, not all of the exhaust gases are scavenged (flushed) out of the cylinder. This is normal. However, as the next air/fuel charge is moved into the cylinder from the crankcase through the cylinder's transfer port(s), it mixes with leftover exhaust gases. Waste gases impede the oxygen molecules' access to fuel molecules just enough to move the mixture ratio *outside* the combustion range. The engine misfires!

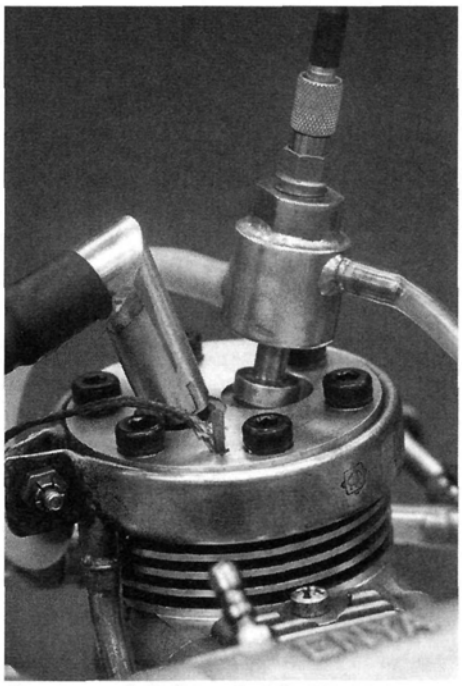
"The unburned mixture does a good job of purging the cylinder, so the next fresh air/fuel charge enters a relatively unpolluted chamber where it again is within the combustible range and ignites. The engine alternately fires and misfires in this fashion, forming the familiar 4-cycling pattern."

Last year, Frank Vassallo and I conducted combustion experiments at Veritay Inc. as part of a contract with the Navy for developing a 2-stroke engine for an unmanned aerial vehicle (UAV) required to operate on so-called "heavy" fuels (JP-5, 8 and 11). These kerosene-like jet fuels possess special physical and chemical qualities, hence the need for our tests.

To measure cylinder pressure versus time, we outfitted the head of our trusty Enya .61 "mule" with a special water-cooled piezo-electric pressure transducer, while time was measured in terms of rpm using a custom tachometer made by Tony Criscimagna of TNC Electronics*. Tony fabricated and calibrated a frequency-to-voltage converter for his standard tach, which allowed us to mate it to our computer data retrieval system.



A tachometer frequency-to-voltage converter (bottom) was required for rpm data retrieval. The unit above the converter is a digital readout for exhaust gas temperature (used to set the needle valve to peak power).

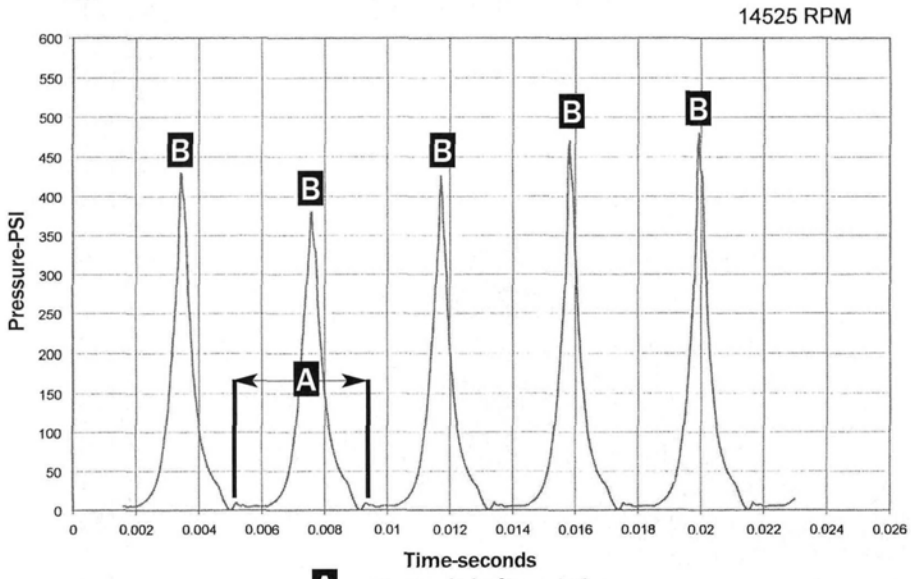


A water-cooled piezo-electric pressure transducer (right) has been mounted adjacent to the spark plug in a special cylinder head, which also contains a head temperature probe (foreground).

After our project work was completed, I suggested to Frank that we run a 4-cycling test. Notice that with the engine peaked to maximum rpm, it fired every revolution of the crankshaft, or about every 4 milliseconds; this corresponds to 14,525rpm (Figure 1). Notice that the average peak pressure during this sample was approximately 438 pounds per square inch (psi). Now look at the pressure versus time graph (Figure 2) for the very rich air/fuel mixture (four-stroking) mode of operation: the three highest cylinder-pressure spikes represent firing events while the others show compression with no combustion. Again, the time between a firing and non-firing event (approximately 6 milliseconds) corresponds with 10,380rpm; stated another way, the time between firing events is about 12 milliseconds, or once every other revolution of the crankshaft. The engine is 4-cycling.

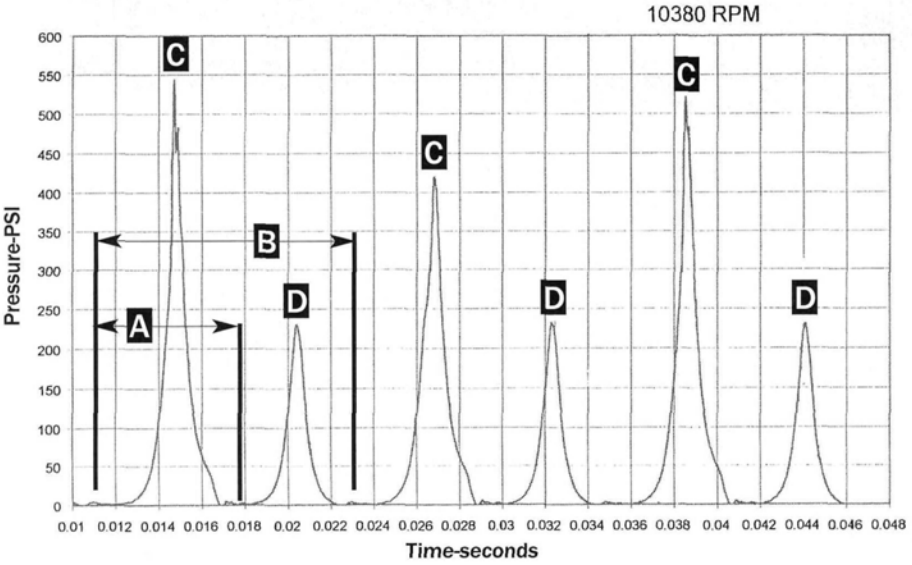
The three firing peak pressure spikes average about 497psi, or about 59psi greater (13.5 percent higher) than the average

Figure 1. Pressure vs. time with engine peaked (JP-8 fuel)



A = one crankshaft revolution.
B = combustion event—each revolution of the crank.

Figure 2. Pressure vs. time during four stroking (JP-8 fuel)



A = one crankshaft revolution.
B = two crankshaft revolutions.
C = combustion event.
D = non-combustion event—(compression only).

firing pressure for the peaked 2-cycling sample. This seems to indicate that a more completely scavenged cylinder—as with the 4-cycle example—produces more work per firing. The 230psi produced by the other non-firing spikes can be accounted for through standard thermodynamic computations for an adiabatic compression with a known effective compression ratio.

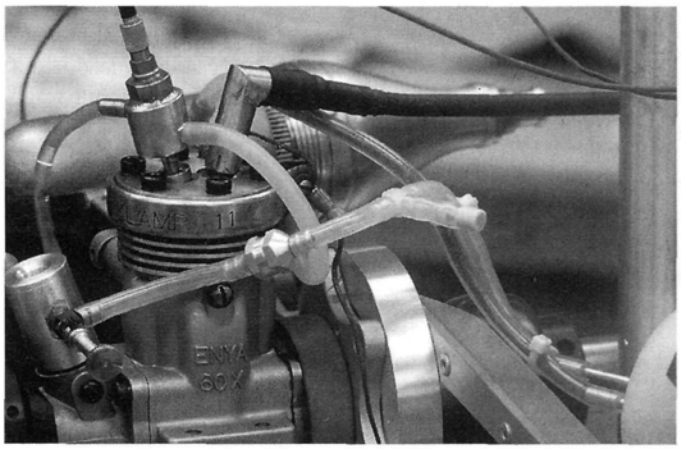
Frank has two other proofs that support the 4-cycle theory from a mathematical perspective based on our retrieved data. We think that 4-cycling truly exists and, more important, is very desirous during the running-in of ringed and ferrous lapped piston engine designs. Reducing the number of firing operations by half through 4-cycling drastically reduces the engine's temperature. Heat is removed by conduction to the unburned liquid fuel, and more is taken away by its vaporization. The rich needle-valve setting coupled with firing on every other revolution ensures that an abundant supply of lubrication passes through the engine at all times. As I've said many times, "Cool and oily; that's the secret to breaking in non-ABC-type engines."

Finally, 4-cycling is detrimental to the longevity of ABC-type engines, which include ABC, AAC and ABN units. Very rich 4-cycling cools the normally tight-fitting piston and cylinder to the point where they contact (at the piston crown) when passing top dead center in the tapered cylinder. In a relatively short time, the very top circumference of the piston wears to a point where it no longer seals properly when the engine heats up after being peaked (needled) for maximum performance, since the cylinder is designed to expand faster than the piston. ABC-type engines should be broken in at a rich 2-cycle mode with occasional short peaked periods such as those produced by momentarily pinching the fuel line.

POLISHING FOR PERFORMANCE

Carlos Adriano Marceddu of Coqueiros Floranopolis, Brazil, writes: "If I polish the internal parts of my .40 to .46 2-stroke engines, will I gain some power? These parts include the crankshaft (internal channel), crankcase (including both transfer and boost bypasses), filing and polishing all cylinder ports, exhaust outlet in the crankcase, and inside the muffler."

Carlos, this question has been asked in various forms since the first model airplane engines were mass-produced more than 65 years ago. Generally, what you're trying to improve is the engine's ability to induct

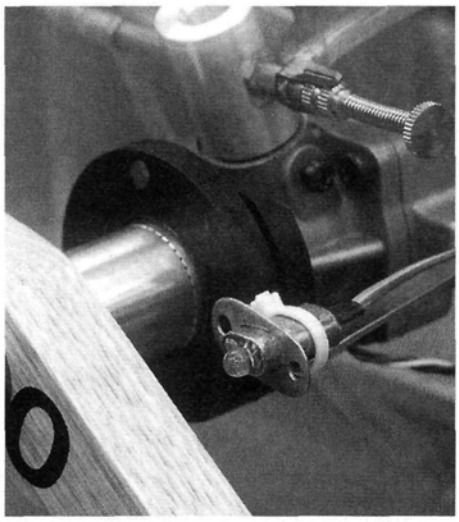


The Enya .60 engine with water-cooled pressure transducer and spark ignition. Special air-induction venturi was used to measure air consumption in other tests.

fresh air/fuel mixture into the crankcase, transfer it into the combustion chamber where it is burned, then clear the cylinder of exhaust gases. Mechanical engineers have terms related to these processes that include: induction efficiency, crankcase scavenging, delivery ratio, combustion efficiency and cylinder scavenging, but the goal is always the same: to improve the cylinder pressure throughout the cycle, providing gains for torque and horsepower or improved fuel economy.

Although polishing may actually improve air/fuel mixture flow in some engines, other design factors are generally more important; some of these include: carburetor design, induction timing, induction and bypass channel geometry, port timing, compression ratio and exhaust system design. Experimenters such as Gordon Blair, professor of mechanical engineering at the Queen's University of Belfast, Ireland, have devoted a lifetime to attempting to isolate and understand the effects and influences of these factors on the performance of the 2-stroke-cycle engine. Although a great deal has been learned, much more remains to be discovered; I believe the effects of component polishing fall into the latter category.

Over the years, most engine modification specialists found (through trial and error) that polishing was a waste of time. However, removing burrs and chips from induction channels, crankcase and cylinder port surfaces ensures that they won't break loose and possibly ruin vital engine components such as the piston-cylinder interface and a crankshaft ball bearing. Spend your time in those areas; it'll be a lot more productive!

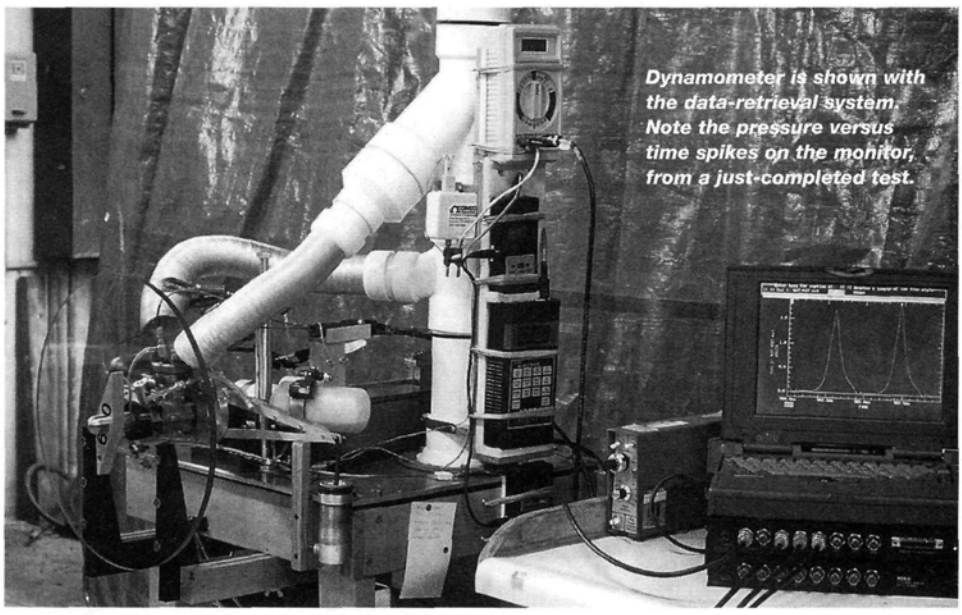


Close-up of the load beam and rpm sensor. Note the black Hall-effect discs (movable: magnet; stationary: sensor) on the engine shaft. These are used to time the spark-ignition system.

MEASURING ENGINE PERFORMANCE

Lloyd Burnham of South Windsor, CT, writes: "My longtime friend and racing buddy Pete Reed says I should write to you regarding measuring engine performance.

"I want to experiment with .40-size engines, which we use in Quarter Midget .40 racing. The problem is, how do we know we've made an improvement (or detriment) without some type of dyno [dynamometer] testing? I mentioned this to Pete and wondered if he knew some simple way of constructing a dyno. He said, 'Nothing is simple.' Typical Pete! Anyway, we want to make modifications to the crankcase and crank and need some scientific way to make the changes."



Dynamometer is shown with the data-retrieval system. Note the pressure versus time spikes on the monitor, from a just-completed test.

Lloyd, Pete is right; nothing is simple! Engine dynamometer practice and equipment, however, are well established (although controversial) for rotary-shaft internal combustion engines. My relatively simple torque-reaction dyno is a home-brew unit that I've been using and modifying since 1969. Without delving into the pros and cons of approximately a half dozen dyno types capable of doing the job, let's discuss some of the things you'll have to take into consideration:

• Dynamometers measure the test engine's crankshaft torque (twisting force) at wide-open throttle for various rpm throughout its operating range. Rpm is determined by the size of the load that the engine is required to turn. In the case of my dyno, the load is represented by a pitchless propeller known as a "load beam." To change the load, the engine must be shut down and a different size load beam installed; then the engine is re-started, re-needled and allowed to temperature stabilize before simultaneously recording rpm and torque data. For best results, you'll need cylinder-head temperature instrumentation to determine when to acquire the data.

I usually select between six and eight load beams for any particular engine being evaluated. Before load beams, actual flight propellers of various pitches and diameters were used; these worked well but usually required some trimming to perform near the desired rpm—a time-consuming activity. Also, before accurate torque data can be compiled, the dynamometer must be carefully calibrated against a torque standard before each new engine test.

• After collecting torque and rpm data from each load beam run, the brake horsepower (measured horsepower), or Bhp, can then be calculated from a standard equation.

• Since dynamometer testing is usually performed over a period of days, weeks, or sometimes months or years, we need a method to compensate for the effects of various atmospheric conditions encountered during each test session. Known generally as the "atmospheric correction factor," this must be applied to Bhp data if compared performances are to have meaning, i.e., Bhp performance can vary up to about 20 percent with extreme weather conditions at the same test altitude. Therefore, the barometric pressure, temperature and humidity (wet bulb temperature)

must be recorded at the time of each test session. These are then used to calculate a correction factor that is applied to the data before it is graphed. Although this sounds complicated, the basics have been well established by the Society of Automotive Engineers (S.A.E.) many years ago and have proved to be accurate and reliable.

• Torque and corrected brake horsepower are then graphed against rpm. This represents the base-line information that is needed for comparison purposes with future dyno tests, i.e., after engine modifications have been made.

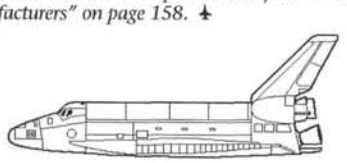
Obtaining a dynamometer is another issue. To my knowledge, the only unit currently available to hobbyists is produced in kit form by American Hobby Products* for approximately $125. Constructed of maple, aircraft-quality birch plywood and plated fasteners, this torque-reaction dyno features ball bearings on the engine's semi-rotation mounting shaft. This dyno will get you started in performance testing without depleting your dedicated hobby account. Of course, if you want professional-quality equipment, it's out there; some units exceed $20,000—not including weather instrumentation!

You've heard the old saw, "It's not the equipment, but how it's used"; this has merit in dynamometer testing. I'd rather have a homemade dyno that has been accurately calibrated with careful data retrieval than an expensive instrument used by an operator who is sloppy or careless; tiny measurement errors are magnified by the calculations, often rendering them useless or misleading.

Many years ago, I wrote an in-depth article for *Flying Models* magazine concerning all aspects of dynamometer performance testing. If "RPM" readers show interest, I'll take the time to update and present specific information in this column. Let *Model Airplane News* know if you're interested.

If you have a question concerning miniature airplane engines, send it to Dave Gierke in care of *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA, or email man@airage.com. I'll respond to as many questions as possible in "RPM."

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✚



 by Gerry Yarrish

Big smoke for big birds

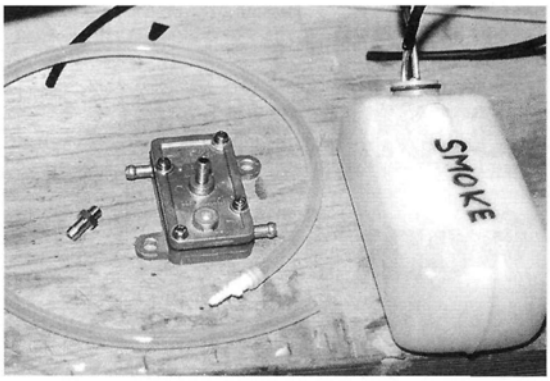
One really neat way to add excitement and enjoyment to flying your big bird is to add a smoke system. A huge billowing trail of white smoke set against a clear, blue sky is a sure-fire way to get attention. Giant-scalers have used smoke systems for a very long time, but for first-timers, all that extra plumbing can seem confusing. Let's look at some basic setups and the equipment you'll need.

The trick to making dense smoke is to deliver the smoke fluid to the muffler so that it atomizes and comes into contact with the hottest part of the engine's exhaust system—the hotter the better. This is one reason why gasoline engines produce such wonderful smoke trails: they have extremely high exhaust temperatures.

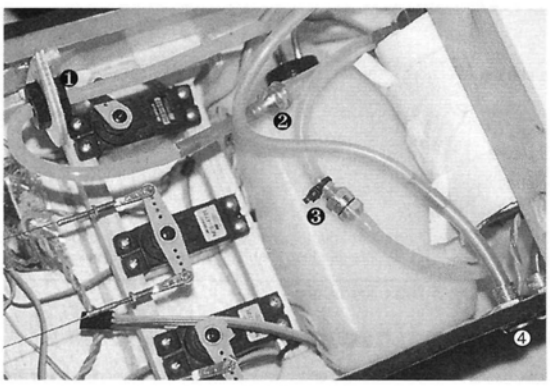
The next best smoke producers are 4-stroke engines. Two-stroke engines, with their relatively low exhaust temperature, require that you preheat the smoke fluid before it reaches into the muffler; in fact, preheating the smoke fluid is always a good idea, and many of the commercially available smoke mufflers have some sort of preheating chamber or a coiled tube built into their design.

Thick, puffy white smoke against a beautiful blue sky: it doesn't get any better than this! Smoke systems are a great way to add to the excitement of flying big birds.

Several manufacturers produce excellent smoke mufflers; the most popular are from Slimline*, Johnson (distributed by Cactus Aviation*), B&B Specialties* and Don Harris*. There are others, but I have used the ones mentioned.



Above: here are the basic parts of the B&B Specialties diaphragm smoke-pump system. You have to connect it to your engine's crankcase with a pressure tap and plastic tubing. Below: here's the plumbing for my CAP 232's smoke system. Note the positions of the regulator (1), filter (2), check valve (3) and filler fitting (4).



SMOKE FLUID

I have had very good results with B&B Specialties smoke fluid. I don't know what it is made of, but it does have a very long shelf life. I had a bottle sitting in my workshop for about three years and when I at last got around to using it, I was completely satisfied with its performance. Super Dry smoke oil from MDW Aviation Associates* is also a popular choice.

Over the years, modelers have used a variety of chemicals and oils for making smoke, and two of the most popular choices are no. 2 diesel oil and automatic transmission fluid (ATF). I have used ATF mixed with Marvel Mystery Oil with good results. I have also used diesel oil, but I do not like the residue it leaves on the model. A release agent called Carvea no. 22 is used in the construction industry to coat the plywood used to form concrete foundations. Also referred to as "form oil," it has been used for many years. By far the easiest way to get smoke fluid, though, is to buy it from a hobby supplier.

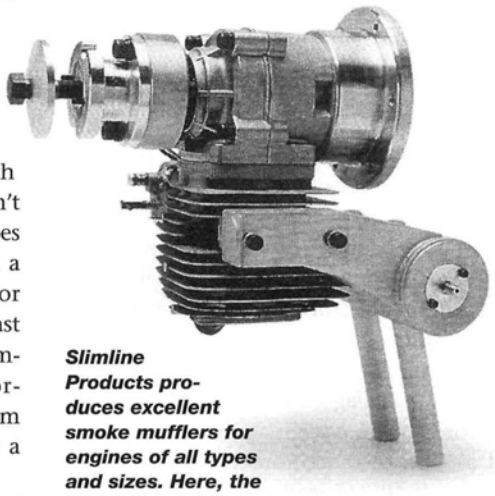
THE PLUMBING

In addition to a second tank, you'll also need:

- a pump to deliver the fluid to the muffler,
- an in-line filter between the tank and the pump, and
- a check valve between the pump and the muffler.

And here's an important detail: set up your smoke system so that the pump draws the fluid out of the tank, not so that it pressurizes the tank; pressurized smoke systems almost always leak.

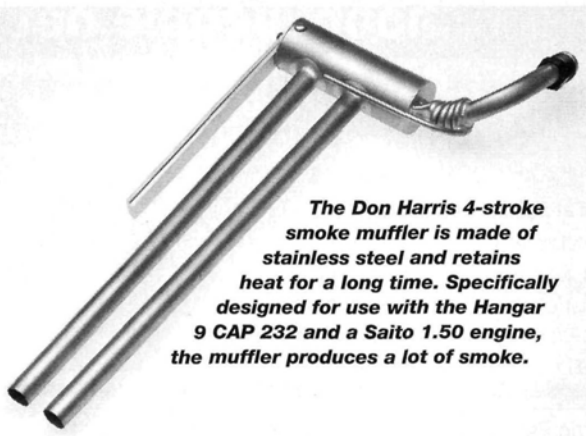
You can use two type of pumps: electrical and diaphragm, which is driven by engine crankcase-pulse pressure. To get pressure from your engine, you will need to hook up the pump to a pressure tap screwed into the engine case. A diaphragm pump is always on when your engine is running, so you'll need an on/off valve between the pump and the tank. Du-Bro* and Varsane Products* make good on/off valves. You won't need a valve with an electric pump.



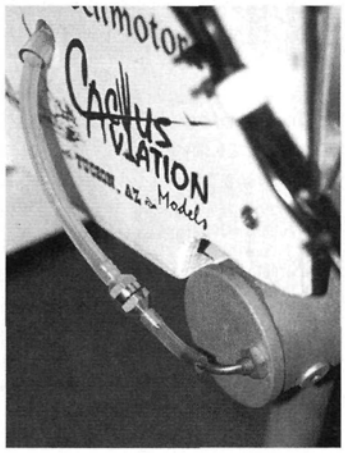
Slimline Products produces excellent smoke mufflers for engines of all types and sizes. Here, the new giant-scale muffler is attached to a Zenoah G-62 gas engine. It has a good internal preheating chamber that can be removed for inspection and cleaning.

SMOKE PUMPS

The two most popular pumps are from TME* and Don Harris*. The TME pump-and-smoke system is available in several versions; the "Simple Smoke" system is the most popular. I use the Harris system in my Hangar 9 CAP 232. I like to color-code the tubing in my model so that I can



The Don Harris 4-stroke smoke muffler is made of stainless steel and retains heat for a long time. Specifically designed for use with the Hangar 9 CAP 232 and a Saito 1.50 engine, the muffler produces a lot of smoke.



Here you can see the smoke line going to the Johnson smoke muffler on my GiantScalePlanes .com Staudacher; note the position of the check valve.

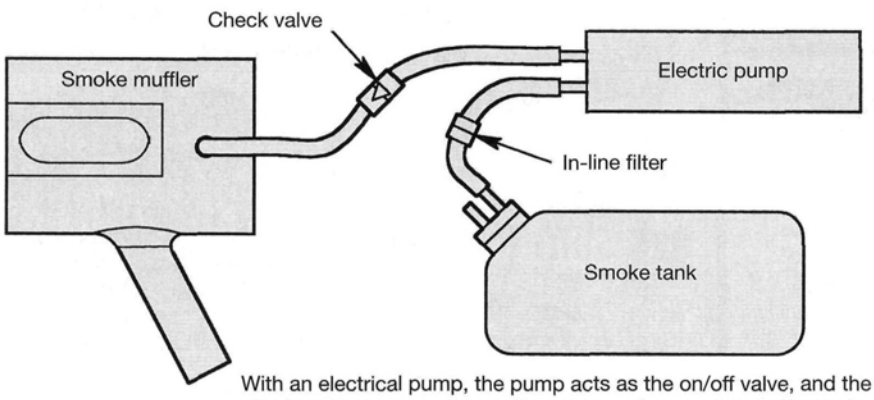
easily tell fuel lines from smoke-fluid lines. I also use a three-line tank setup with a separate vent and filler line; the filler line also has a "clunk" pick-up, so emptying the tank at the end of the day is a snap.

Another important item in the smoke system is having a way to regulate how much fluid is delivered to the muffler. It is possible to deliver too much fluid, and this will decrease the amount of smoke produced because the fluid cools the muffler. You might also kill your engine with too much smoke fluid. I use a simple setup to adjust the flow: I slip a wheel collar over the line between the tank and the pump; by tightening the collar's setscrew (be sure to grind off its pointed tip), I can squeeze the line to let less fluid through. If you attach the collar to a bulkhead close to the fuselage side wall, you'll be able to drill a hole in the fuselage and use an Allen wrench to make the adjustment without having to remove the wing.

You need a check valve so you'll have a positive shutoff of smoke fluid when the pump is turned off and so the muffler doesn't send pressure back into the tank. It is also a good idea to use wire clamps or twist-ties at all the line connections in the system—just in case.

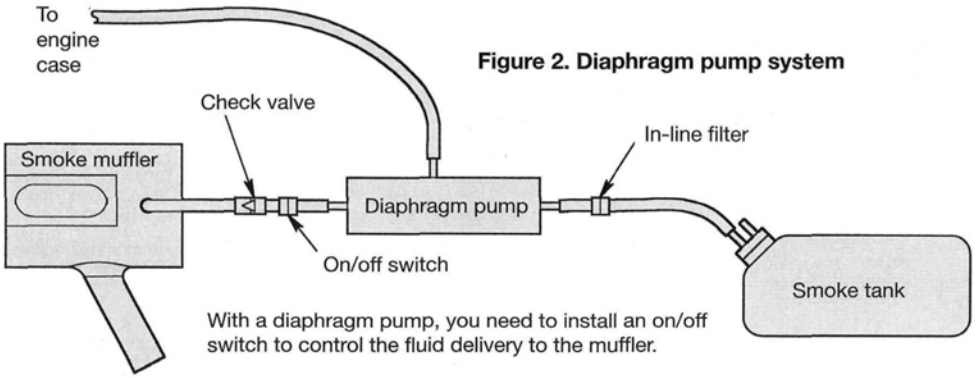
For good smoke in most airplanes, expect to use 2 ounces of fluid per minute of smoke; a 16-ounce tank provides about 8 minutes of smoke. Also, try to keep the smoke tank as close to the CG as you can to minimize any trim changes as the tank is emptied. I have used silicone fuel tubing, Tygon gasoline line, automotive vacuum line (neoprene) and clear vinyl aquarium tubing; all have worked well with the B&B fluid, but test it before you try something new.

Figure 1. Electric pump system



With an electrical pump, the pump acts as the on/off valve, and the check valve prevents the muffler pressure from getting to the tank.

Figure 2. Diaphragm pump system



With a diaphragm pump, you need to install an on/off switch to control the fluid delivery to the muffler.

FLYING WITH SMOKE

To maximize your smoke-on time, try to fly like a show pilot; turn the smoke on before you do a maneuver and turn it off when you've completed it. If you fly all over the place with your smoke on all the time, it loses its impact and does nothing more than waste fluid. Try to set up your maneuvers so that you do them in front of yourself and centered on the runway. You'll find that because of the great visual aid that streams behind your model, you'll be able to keep track of your maneuvers more easily. I use the retract switch for my smoke switch, and to prevent an accidental deadstick, I mix the smoke channel into throttle so that the channel comes on only when the throttle is set at ½ or more.

Above: regulating the amount of fluid entering the muffler is important to producing good smoke. Here, the CAP has too much fluid going into its muffler. Reducing the flow with a wheel-collar regulator slipped over a smoke line makes the smoke denser because of the higher muffler temperature. Right: here the smoke is perfect; using less fluid also gives you more smoke-on time.

Well, that's it for the basics. Installing a smoke system isn't difficult, and as long as you have a good hot muffler or a preheating chamber or coil, you'll get loads of great white smoke. Enjoy yourself, and remember to keep looking at your model and not at the smoke trail!

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*

MODEL AIRPLANE NEWS
PRODUCT
REVIEW

by Gerry Yarrish

Vita-Cal Decal Printer Paper

Wouldn't it be great to create your own water-slide decals in any size and number that you wanted? Thanks to Vitachrome Graphics*, now you can! Vitachrome has just introduced Vita-Cal, a coated decal paper for ink-jet printers. The Vita-Cal Starter Kit (part no. 5070), priced at $24.95, comes with five white- and five clear-background (8½x11-inch) sheets and Vita-Clear, a clear transfer spray. Use the white background if you want to put the decal over a dark-colored surface and make the image opaque. Use the clear if you want to layer decals, or when you want the model's surface to show through. Here's how it works.

Make any water-slide decal you want with an ink-jet printer!

1 Select an image you want to copy/scan, or you can create your own graphics using a drawing or painting program. I used the Visioneer 7600 One-Step scanner and the Corel Draw graphics program. Here you see the Messerschmitt Me-109 documentation and the test page that I printed on plain paper. Note that I have enlarged some of the markings and shrunk others to create different scale sizes.

Once you are satisfied with the printed test image, put the Vita-Cal paper into the printer's paper tray (coated-side face down), and hit the Print key.

2 Let the ink dry for a few minutes, spray the sheet with a couple of light applications of the Vita-Clear transfer coat, and then let it dry over night. To prevent dust from settling on the wet transfer coat, cover the sheet with the lid of a shirt box.

When the sheet is dry, cut the decal away from the main sheet, and carefully trim the excess paper away from the individual shape. If you're using white-background paper, be sure not to leave any white edges around the decal.

3 Put the decal in a bowl of room-temperature water for about 30 seconds or until you can slide the decal around on the backing paper.

4 Clean the model's surface, and then moisten the area where you want the decal. Slide it partially off of the backing paper, and then slide the decal into place on the model.

5 To remove water or air bubbles from underneath the decal, squeegee it with the transfer side of the backing paper. With the decal positioned, blot away any remaining water with a soft lint-free paper towel or tissue. Let it dry, and then

spray a protective clear-coat over the decal to seal it. Be sure to test the compatibility of your clear-coat with the decal before you apply it to your model.

6 That's it! You've created a custom-made, scaled decal for your model. With a computer, scanner and printer, you can make any decal you want in about ten minutes, plus drying time for the transfer coat.

PRINTING TIPS

Depending on the printer, you might have to adjust the paper setting or print speed to improve the quality of the decals. I used a Hewlett-Packard 812C to make these examples. The decal sheet in the background was printed in normal or plain-paper mode, while

the sheet in the foreground was printed in glossy-photo paper mode. The glossy-photo setting prints with a fast print-head speed and a slow paper-feed speed; the difference is obvious!

Printers do not print with white ink, but you can layer decals for this effect. To produce a decal with white areas, make two separate decals, one with the white areas on the white-background paper and the other one on the clear-background paper. You can then layer the decals to produce the desired image.

To avoid wasting an entire sheet of Vita-Cal, you can cut the large 8½x11-inch sheets into ½- or ¼-size sheets and run these through the printer. Be sure to put the smaller sheet against the right side of the paper-feed tray and position the image on the screen so it will print correctly.

Give Vita-Cal a try. I am very impressed with the quality of these do-it-yourself decals; I'm sure you will be, too.

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.* ✈

GRASSROOTS *by Gerry Yarrish*

Reports from readers around the world!

Send in your event coverage. Mail photos, captions and text (500 words or less) to "Grassroots," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. Color slides and prints are acceptable.

Scott Grey—a top-notch national heli champion—gave us a very low, very exciting heli demo. Flying his Ergo inverted and backwards was only the beginning!

25th Annual Kingston Ontario Father's Day Fun Fly

A quarter century of family fun and competition

For the past 25 years on Father's Day weekend, competitors and scale fliers have arrived in Kingston, Ontario, Canada, to renew friendships and fly in scale and timed fun-fly events, enjoy the warm June temperatures and just have a lot of fun. Hosted by the Kingston Radio Control Club and overseen by contest director Rolly Siemonson, it's always a great success.

The classes are Sportsman, Expert and NCFFA (National Competition Fun Fly Association); the scale event is popular; and the junior fun fly gets the kids involved. In all classes, though the competition is real and at times very close, no one loses sight of the weekend's main mission—having fun! Having attended for 13 years, I feel qualified to say that bruised egos and airplane damage are always secondary to the enjoyment.

A typical fun-fly machine. Note its lightweight construction, large control surfaces and profile fuselage.

The basic fun fly comprises a selection of timed events that include having to take off, do three loops, three horizontal rolls, three vertical spins and then a spot landing. Other events involve a bomb drop and a timed 2-minute flight, and this year, we were treated to something new—"Can-Can." During this, models had to fly trailing a long piece of fishing line to which a soda can had been attached. Pilots had three chances to make "spot landings"—with the can; not the airplane! Sound like fun? It was, indeed! Popular models include everything from old trainers and Florio Flyers, to Nifty Fiftys and Sig Somethin' Extras. I competed with my Thunder Tiger profile Giles 202 ARF.

In Expert, more specialized airplanes such as the wing-and-boom Smith Specials and other hybrid lightweight original designs are put through their paces. Unlimited control mixing is allowed (the Sportsman class doesn't allow mixing wing-and-boom models). Whichever class you fly in, one thing is certain: the excitement is addictive.

Scale competition is a low-key, relatively simple affair consisting of three mandatory maneuvers and three optional ones. Takeoff, a procedural turn and landing are required of every-

This Zenoah G-23 powered Pica Waco biplane is more than 10 years old! The model and its pilot, Robby Francis, are regulars at the Father's Day event.

Fun Fly airplanes such as this Sig Somethin' Extra are very popular at this annual meet. Spot landings, touch-and-go's and timed events make the weekend fun for everyone.

Model Airplane News ***contributor Russ Pribanic prepares to start son Justin's Stunt Wagon for another round of Sportsman Fun Fly.***

one, while loops, rolls, spins, wing-overs, stall turns, etc., fill out the rest of the flight cards.

Static judging requires documentation and is completed before the planes are flown (with the model in the center of a 30-foot circle). Pilots' static scores are added to the average of the best three out of four flight scores. Owing to rain and wind, this year, we had only two flight rounds to average.

Having been CD for the past 25 years, Rolly Siemonson decided to take a well-earned retirement from his duties and thanked all for their support. With someone new at the helm, we'll all be back in Kingston on the same weekend in 2001, so mark your calendars. What better way to spend Father's Day! I'm confident that the next 25 years will be every bit as much fun as the last! Plan to attend; it's definitely worth the trip.

Harry Cummings' very nice Midwest Texan.

Beware of Chris Maier!

Competition knows no limits, and the last factor to consider when assessing a flier's potential is his age—as we all discovered in Kingston! At just 12 years old, Chris Maier of Whitehall, PA, showed everyone that size and age have no bearing on flying capability.

Though he's only 12 years old, Chris Maier sure can fly that big triplane! Built from the Flair kit, Chris's Fokker is powered by a 1.20 4-stroke engine. You should see him nail those landings! Scale competitors were challenged by windy conditions, but nothing could stop this young man from taking second place.

In a word, Chris is consistent. He flies with the style of a seasoned modeler because that's what he is; he has been flying for more than half his life, and when he grabs the sticks, it shows!

Putting in some very solid scale flights with his ¼-scale Fokker Dr. 1 triplane, Chris competed in more than one type of event: he took on Sportsman Fun Fly and Scale. What's more, he placed first in the former and second in the latter.

The older Sportsman pilots hope that Chris will discover girls soon, and that will keep him away from the field for a while; if he leaves the competition to them, they'll have a chance to win. But if you ask Chris, girls don't hold a candle to model airplanes; either way, we'll see him again in the winners' circle. Congratulations, Chris! You're a fine pilot and a good competitor.

MODEL AIRPLANE NEWS
PRODUCT
REVIEW

Low cost, low weight, high performance

by Bob Aberle

Grand Wing Servo R-4P receiver

SPECIFICATIONS

Weight: 0.21 oz. (6g)
Dimensions: 1x⅝x½ in. (including the crystal)
No. of channels: 4
Frequency band: 72MHz
Modulation: FM
Conversion type: single
Street price: $28, including the crystal

Comments: this is a highly selective micro receiver that exhibits excellent radio range yet weighs only 6 grams. The price is certainly right!

It seems that every month brings us yet another new micro RC receiver. This time it is the Grand Wing Servo (GWS) R-4P Pico FM narrowband micro receiver. It will be sold in the U.S. by several popular hobby distributors; my sample was provided by Bob Peru of Balsa Products Inc.*

The unit measures 1x⅝x½ inch (including the crystal) and tips my digital scale at just 6 grams (0.21 ounce). Included in this weight is a very basic plastic case and a rather long 39-inch antenna; I suspect the weight could be further reduced by eliminating the case. This receiver exhibits exceptional radio range, so it might be possible to reduce the antenna's length for indoor flying.

Two models are available. One is marked "F" and is intended for low side FM deviation such as that produced by Futaba and Hitec FM transmitters. The "J" version is intended for high side FM deviation produced by JR and Airtronics transmitters. You must stipulate the deviation when you order. Balsa Products will initially offer 72MHz RC channels: 17, 18, 19, 20, 21, 50, 51, 52, 53 and 54. Other channels should be available by the time you read this article. Not only does this receiver offer excellent operational performance, but it is inexpensive—just $28 including the crystal.

The unit has standard RC connectors; the center pin is battery positive, and the pin facing the end of the case is battery negative. The third pin, which faces the crystal, is the signal connection. Note that only four connector ports are provided. When you use all four channel functions, you will need a Y-harness to connect the battery. When you use an electric motor speed controller, however, you won't need the Y-harness.

Another nice feature of this GWS micro receiver is that it does not have a fail-safe mode. This is very important because some of the micro receivers with this feature have been known to go hard over on the controls at range extremes and when the signal is interfered with.

Initially, I ran some selectivity tests to see whether an adjacent RC channel might interfere with this micro receiver. My receiver operated on channel 51. Using a Hitec Prism transmitter fitted with a Spectra synthesized RF module, I dialed up two adjacent channels (50 and 52) that are just 20kHz away from the receiver's operating frequency. Even under this signal bombardment with the two transmitter antennas practically touching each other, there was no sign of interference. So, it is perfectly OK to fly with this micro receiver at a highly populated flying site.

Front view.

Back view.

Next, I made an operating range check with the transmitter antenna fully extended as it would be under normal flying conditions. In recent micro receiver tests, I was pleased to note a range of about 600 feet before losing the radio signal. This GWS micro receiver produced good solid operation beyond 1,000 feet before I ran out of field and couldn't go any farther. I consider this performance absolutely amazing.

As mentioned earlier, the antenna is rather long at 39 inches. This can prove a problem when flying tiny 50- to 100-square-inch, 2- to 3-ounce models. But as mentioned, you might consider reducing its length for specific indoor applications where a range of only several hundred feet would be necessary. Do not touch the antenna if you plan to fly outdoors!

Connections to this receiver exit from the top of the case. A model with the connector block at the end of the case may be available later; this will increase flexibility in certain RC installations. Operating voltage was stated to be 4.8 to 6 volts. I did operate the receiver for test purposes on three Ni-Cd cells, and it worked properly. I suspect that at this low voltage, the servos might stop working before the receiver, so be careful at that point.

The total weight of this GWS micro receiver, plus two Hitec HS-50 micro servos, a Castle Creations Pixie-7 ESC and four, 50mAh Ni-Cd cells is 40 grams (1.41 ounces). This is suitable for flying an electric-powered model that weighs no more than 3 to 4 ounces. Dropping out the ESC would still allow 2-channel control of a CO_2 or rubber-powered model with the total RC weight at only 36 grams (1.27 ounces). There are other alternatives to consider that might allow even lighter weights.

The bottom line is that this new GWS Model R-4P micro receiver offers excellent performance in the micro-flight world at just $28. Can you beat that?

**Addresses are listed alphabetically in "Featured Manufacturers" on page 158.*

PRODUCT WATCH

Editors' picks of the month

AT MODEL AIRPLANE NEWS, we not only tell you what's new, but we try it out first to bring you mini-reviews of the stuff we like best. We're constantly being sent the latest support equipment manufacturers have to offer. If we think a product is good—something special that will make your modeling experiences a little easier or just plain more fun—we'll let you know here. From retracts and hinges to glow starters and videotapes, look for it in "Product Watch."

SKS VIDEO PRODUCTIONS

Top Gun 2000 and Joe Nall 2000 Videos

Almost as good as being there!

Whether you're a participant who wants a topnotch record of your achievement, a spectator looking to relive the experience, or a fan who couldn't make it to the events, the SKS Video presentations of Top Gun 2000 and Joe Nall 2000 are worthwhile additions to your video library. Each video is packed with exciting flying footage and detailed descriptions of the featured aircraft by each owner.

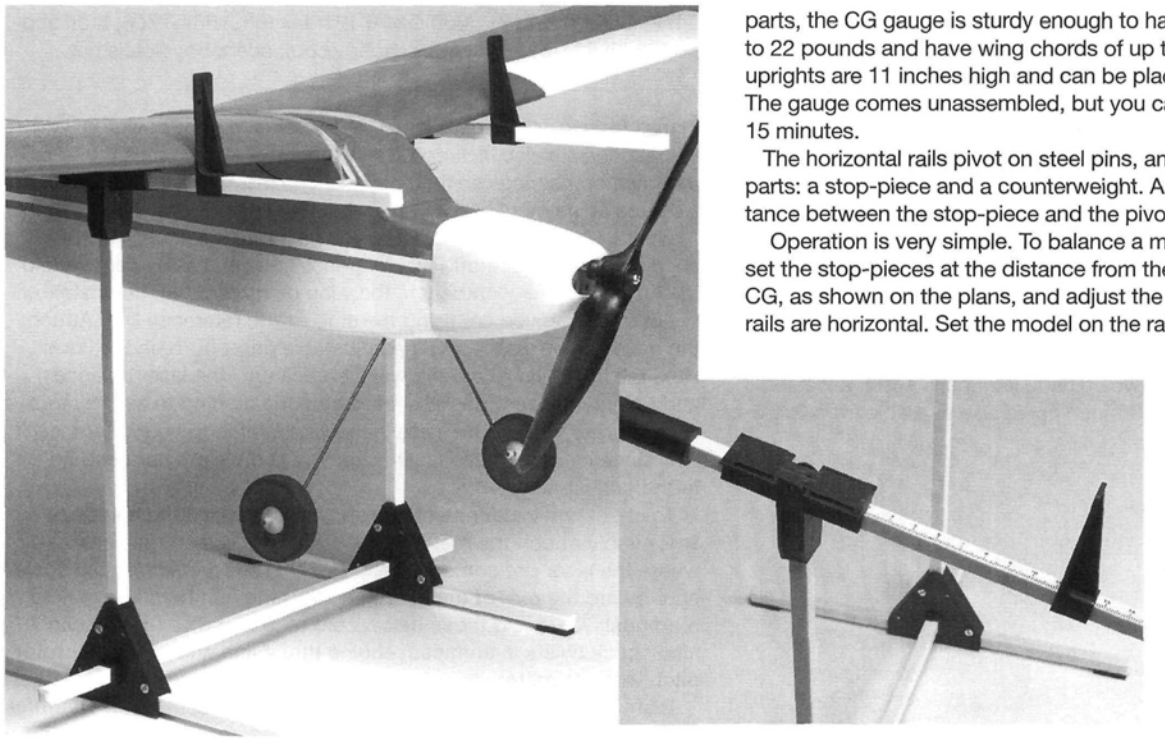
The Top Gun video provides many close-ups of the details that make these planes the best of the best. Highlights include Terry Nitch's Rafale, Tommy Woods' F-4, Gary Bussell's Spitfire and Bud Roane's Shoestring. The whine of the turbines really comes through on the video, and watching it, I felt as thought I were there. The video also covers the half-time show and the trophy presentations.

The precision and aerobatic flying are reasons enough to buy the Joe Nall video, but coverage of this giant-scale event also features lots of detailed close-ups of the most beautiful and innovative aircraft from the 476 registered pilots. The video contains excellent footage of the awesome 400-acre flying site at Triple Tree, SC, including my favorite, the piece on the floatplanes flown at the site's mile-long lake.

The production quality on both videos is quite good; each tape captures the sights and sounds that make these events so much fun, although I would have preferred a bit more commentary during the flight sequences. The videos provide a good overview of both events, while managing to hit the main attractions in detail. I came away with an excellent overall impression of what it was like to be there.

The runtime for each video is approximately two hours. Top Gun 2000 costs $24.95; Joe Nall 2000 costs $19.95 (plus S&H).
—Matt Boyd

SKS Video Productions, 85 Pine Rd., Abbottstown, PA 17301; in USA (800) 988-6488 ; (717) 259-7193; fax (717) 259-6379; www.sksvideo.com; scott@sksvideo.com.



MULTIPLEX

Center-of-Gravity Gauge

Keeping centered

One of the last, most important things you need to do before a new plane's crucial first flight is to make sure its center of gravity (CG) matches that shown on the plans. Multiplex's CG gauge really simplifies this task. Constructed of 5/16-inch-square aluminum and composite parts, the CG gauge is sturdy enough to handle planes that weigh up to 22 pounds and have wing chords of up to 18 inches. The two uprights are 11 inches high and can be placed up to 11½ inches apart. The gauge comes unassembled, but you can put it together in about 15 minutes.

The horizontal rails pivot on steel pins, and each has two sliding parts: a stop-piece and a counterweight. A scale measures the distance between the stop-piece and the pivot point in millimeters.

Operation is very simple. To balance a model at the prescribed CG, set the stop-pieces at the distance from the wing's leading edge to the CG, as shown on the plans, and adjust the counterweights until the rails are horizontal. Set the model on the rails with the wing's leading edge up against the stop pieces. Add ballast or rearrange equipment until the model stays level.

To check a model's actual CG, set the plane on the gauge so that the model balances level. Slide the stop-pieces up against the leading edge, and read the distance to the CG using the ruler that's printed on the rails. Then remove the plane, and set the rails horizontally by adjusting the counterweight. As a final check, put the model back on the rails and make sure they remain horizontal.

This is a well-made and practical tool that will get a lot of use in my workshop. And with a street price of only $35, it is a good value, too.
—Jim Onorato

Multiplex, USA, 14751 Calvert St., Van Nuys, CA 91411; (818) 838-6467.

ACE HOBBY DISTRIBUTORS

Super Digipace 3

Health cycle for your batteries

The care and feeding of rechargeable Ni-Cd or nickel-metal-hydride (NiMH) batteries is an important aspect of the RC hobby, and this includes cycling them periodically. Cycling eliminates "memory" and is the only sure way to test the operational capacity of a rechargeable battery.

To properly cycle a battery you must fully charge it, then discharge it at a fixed current to a predetermined voltage while you record the time interval. To determine the capacity in milliamp hours (mAh), multiply the discharge current (in mAh) by the time (in hours).

For over 15 years, Ace Hobby Distributors has manufactured a battery cycling device called the "Digipace." The Super Digipace 3 is the latest, state-of-the-art microprocessor version in the Digipace series.

At the push of the start button, the Super Digipace 3 automatically cycles batteries as follows: it discharges both an 8-cell transmitter and/or 4- or 5-cell receiver packs, recharges the batteries at the standard, overnight charge rate for 16 hours, then switches to a trickle-charge rate that allows the batteries to remain on charge indefinitely, always ready for use. You can switch the four-digit, high-visibility LED display between the operational capacity in mAh and the time left to fully charge in hours and minutes. A second sliding switch determines whether the display shows transmitter or receiver battery-pack data. A receiver charge-rate switch lets you charge the receiver batteries at 35, 70, or 140 mAh, and a fourth switch allows the cycling of either a 4- or 5-cell receiver pack. Two sets of multicolored LEDs indicate the cycle status for both the TX and the RX batteries: red for discharge, green for normal charge and yellow for trickle-charge.

If you didn't start the first cycle with the batteries completely charged, repeat the cycle when the normal charge is complete for a reading of the actual operational capacity of the battery packs.

A 24V AC power supply, two 0.10-inch DC power plugs and hookup wire are provided. You have to provide the proper charge connectors to fit your particular radio system. You can also build a simple LED/resistor cable tester to verify the correct cable polarity with the parts included with the Digispace.

The Digipace has rack-type handles so that the unit can rest horizontally or vertically on your bench or shelf, or it can be stacked with related Ace products.

Note that some radio systems have a diode in the transmitter charge circuit to prevent the possibility of reverse charging. To discharge the transmitter pack, you must bypass the diode either by shorting it out or by unplugging the transmitter pack and accessing the diode directly.

If you want to give your batteries the TLC they need, the Ace Super Digipace 3 is a worthwhile investment at a street price of $99.99. —*Jim Onorato*

Ace Hobby Distributors, 116 W. 19th St., Higginsville, MO 64037-0472; (800) 322-7121; (660) 584-7121; fax (660) 584-7766; tech support (660) 584-6723; www.acehobby.com; acehobby@ctcis.net.

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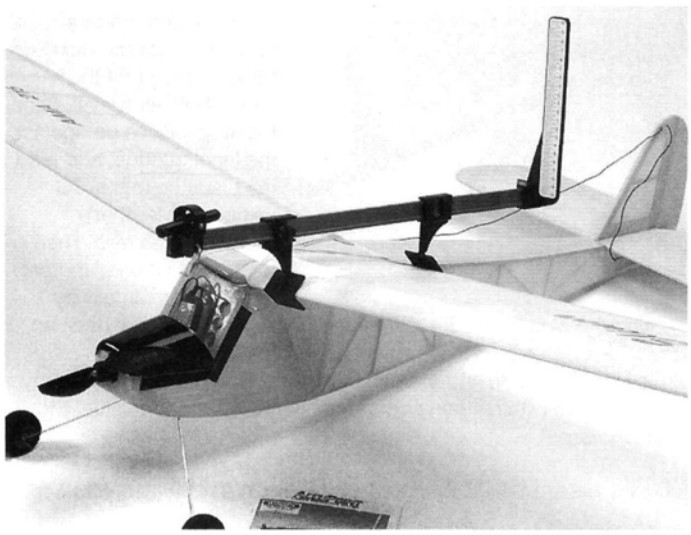
Misalignment between flight surfaces can cause many flight problems. If the wing or stab incidence or the engine thrust angle does not match the design specifications, an airplane will not fly as the designer intended. The Great Planes Laser Incidence Meter lets you pinpoint inaccuracies in your model quickly and easily.

The incidence meter consists of six easily assembled parts: a 20-inch anodized-aluminum bar, two adjustable grips, a scale, a weight block and a laser. An optional 36-inch bar is also available from Great Planes for use with larger planes. The laser is battery-powered, and its batteries are also included. The weight block that holds the laser is mounted on bearings so that the laser can move freely. The block has a coarse adjustment and a brass wheel for fine adjustment.



Operation is very simple. First, you calibrate the scale to a reference line on your aircraft. This reference line can be the centerline of the fuselage, your workbench, the wing or, more often, the stabilizer.

Let's assume you are using the stab as the reference line. Attach the meter to the stab using the adjustable grips. Turn on the laser. Hold the laser and rotate the weight block until the laser balances and points near zero degrees. Fine-tune the reading to zero by turning the brass wheel. The meter is now calibrated to your reference line. Once calibrated, the laser assembly and weight bar need no further adjustment.

To check the incidence of any surface relative to the reference line, simply attach the meter to the surface and read the scale where the laser dot comes to rest. Position the meter with the scale end toward the rear of the aircraft so that the numbers above zero read positive (+) and those below zero read negative (-). You can also check twists in surfaces, engine thrust line and helicopter rotor pitch with the meter.

Warning: this tool uses a laser diode. A laser beam can be harmful to the eyes, so never look directly into the beam while the unit is on. Laser light can also be dangerous when reflected off a mirror or any similar reflective surface, so be careful.

The meter costs $39.95 and comes with a one-year limited warranty. —*Jim Onorato*

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Kudos to Jonathan Christians of Kanawha, IA, for correctly identifying our September 2000 mystery plane, the Convair B-58 Hustler. The 57-foot-span Hustler was manufactured by General Dynamics Corp. in Ft. Worth, TX, and first underwent flight testing in 1957. Touted as "America's first supersonic bomber," the Hustler was also the first airplane designed to carry a detachable fuel or bomb pod underneath the fuselage. The astoundingly complex Hustler required a crew of three (pilot, bombardier/navigator and defense-systems operator) and achieved a maximum speed of over 1,300mph at its combat ceiling of 63,000 feet.

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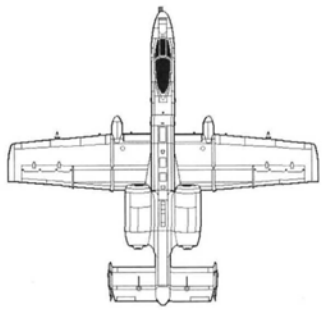

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Budget "Boomerang"

David Jones of Palmetto, FL, is an extremely accomplished RC'er who earns a living by working with electronics. Like many RC'ers, he also enjoys a challenge. When he heard about the miniature RC aircraft that the military uses as spy drones, he was amazed by their cost: $60,000 to $100,000 and more! David set out to accomplish the same objective at a fraction of the cost.

PHOTOS BY DAVID JONES

Boomerang on takeoff before its momentous solo flight.

David knew that a Global Positioning System (GPS) unit could be accurate to within a few feet, so navigation was possible if he could program the model's servos to interface with the GPS. With a barometric pressure sensor (BPS) to maintain the desired altitude and an RC backup system for safety, David had all the means to create a model with autonomous flight control.

GPS 315 PHOTO COURTESY OF MAGELLAN SYSTEMS

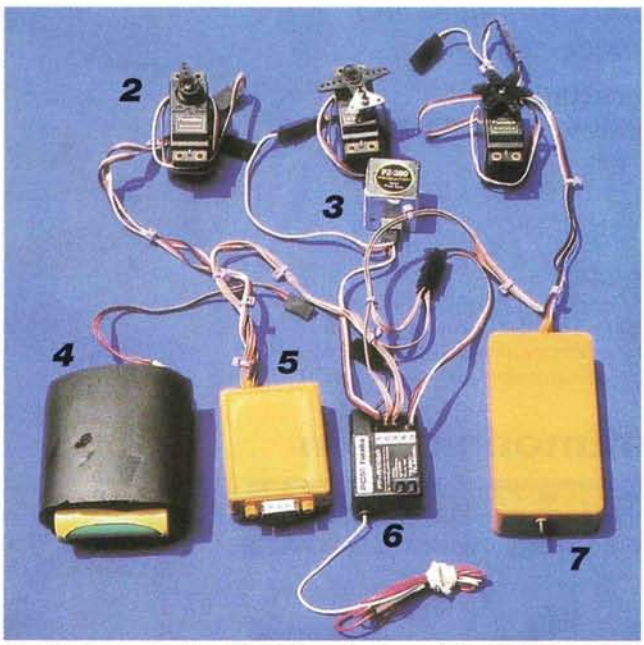
After much research and midnight oil, David built a suitable system that performed as he had hoped in the bench test. Total cost? Less than $1,200! David installed the system in a Sig Senior Kadet, and he test-flew and tweaked the craft—called "Boomerang"—until it performed as programmed.

For its first official flight, Boomerang was programmed to fly 13 miles from the Valkyries of Manatee RC Club field to the Manatee County Club RC field and back again. David's fellow Valkyries club members assisted, and observers with cell phones were stationed at each field and at checkpoints along the way.

On the morning of May 14, 2000, David controlled Boomerang's takeoff and turned on the self-contained navigation/piloting system when the plane reached altitude. After hunting a bit, the craft assumed straight flight in the anticipated direction.

When the model was out of sight, there was some consternation at home base because the spotters didn't report the anticipated sightings at the predicted times, but everyone cheered when the observer at the Manatee Club RC field announced that the craft was in sight. Boomerang crossed the field and then executed a gentle, 180-degree turn to head back in the direction from which it arrived. The program was half complete!

Back at the Valkyries field, the excitement faded when nothing was in sight long after Boomerang's anticipated arrival time. Suddenly, an observer said, "Isn't that it, out there to the north?" As everyone watched, the craft circled the field. David took back control using his transmitter and brought Boomerang in for an uneventful landing. Whoops of joy went up at the obvious success!



David's homemade autopilot system consists of: 1. Magellan 315 GPS unit; 2. three servos (rudder, elevator, aileron); 3. Revolution piezo gyro; 4. battery; 5. GPS interface; 6. Futaba receiver, and 7. barometric pressure sensor.

After analyzing the data, David figured out why Boomerang had taken so long to reach its destination. For the 26-mile trip, the anticipated flight time was 30 to 35 minutes, yet the craft flew 48 miles in 68 minutes. David concluded that Boomerang had flown a zigzag path instead of a straight one because its ailerons weren't centered. This caused the plane to continuously turn to the right, but the GPS system ensured that it flew back on course. To avoid this situation in the future, David needed only to center the ailerons so the model would respond more quickly to the GPS commands.

So, what's next for David Jones? The system obviously works, so how about flying from coast to coast in Florida? David is already working on a more sophisticated aircraft that will be up to the challenge. Beware, Daytona Beach! If you'd like more information on Project Boomerang, contact David at 4dogs@gte.net.

SPECIFICATIONS

Name: Project Boomerang

Model type: Sig Senior Kadet

Weight: less than 10 lb.

Radio: 5-channel Futaba

Engine: SuperTigre .90 2-stroke

Total engine run time: 1 hr., 8 min.

Fuel qty. and type: 50-oz. tank; flight used 39 oz. of Byron 15% nitro 20/80 synthetic/castor blend

Average cruise speed: 45mph

Total flight distance: 48 miles

Total flight time: 1 hr., 4 min.

GPS model: Magellan 315 (hand-held)

Total project cost: less than $1,200 (lots of used and free parts)